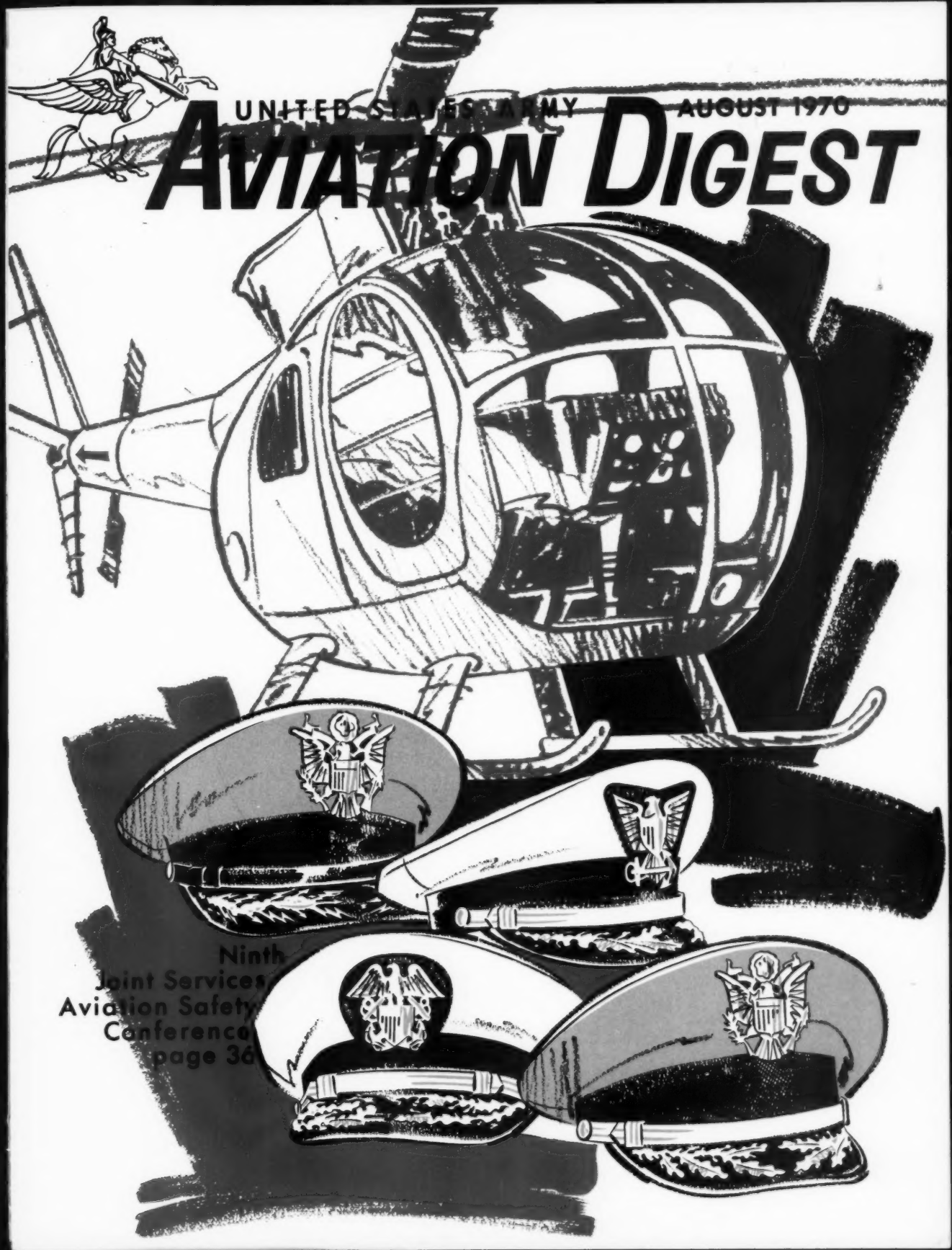
UNITED STATES ARMY AUGUST 1970

AVIATION DIGEST



Ninth Joint Services Aviation Safety Conference
page 36

UNITED STATES ARMY AVIATION DIGEST

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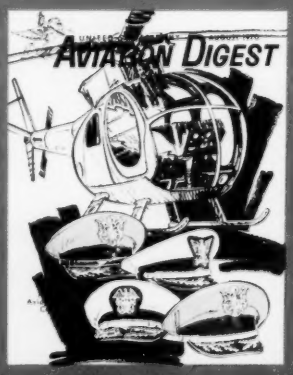

The mission of the U. S. ARMY AVIATION DIGEST is to provide information of an operational or functional nature concerning safety and aircraft accident prevention, training, maintenance, operations, research and development, aviation medicine, and other related data.

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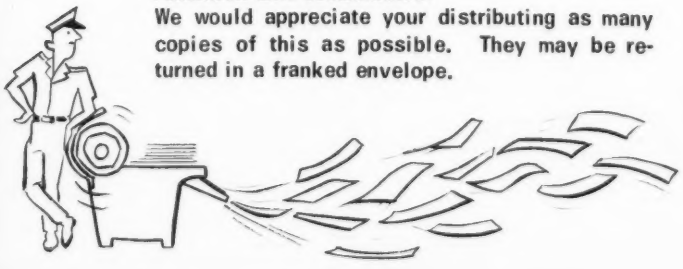

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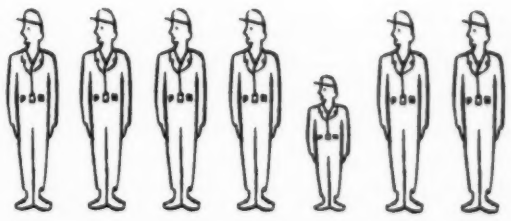

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Come Down To Earth

READ . . .

POTPOURRI

✦Metal landing mats, which have provided landing fields for aircraft since World War II, are now being used in the Republic of Vietnam as a protective shield for CH-54 Flying Crane helicopter.

The mat sheets, arranged to form a portable revetment were constructed by Company B, 92d Engineer Battalion, 20th Engineer Brigade, under the supervision of Chief Warrant Officer Royce C. Adams for use at Sanford Army Airfield at Long Binh.

This type of revetment was first introduced and tested by the Corps of Engineers at the U. S. Army Engineer Waterways Experiment Station, Vicksburg, Miss. Its tests indicated the matting is very effective toward stopping rocket shrapnel (see DIGEST January 1970, pages 26 and 27).

A captain at Ft. Eustis, Va. recently challenged the authority of the dictionary and won. CPT Martin Legault, a project officer at the Army Transportation School, decided the publishers of the Merriam-Webster Dictionary had erred in the definition of the word "helicopter."

He wrote to the Merriam Company of Springfield, Mass., and received a reply thanking him for pointing out the error.

"We agree," the company replied, "that this definition implies that the primary support in the air for a helicopter is derived from the reaction of a stream of air driven downward by one or more rotors when, in fact, a helicopter is supported in the air primarily by the aerodynamic action of air moving over airfoils."

The letter said the definition is now being changed to read, "is derived chiefly from the aerodynamic forces acting on one or more rotors turning about substantially vertical axes."

The people at the Transportation Center should know. The Army Transportation School has been teaching helicopter maintenance courses since 1954, and about 70 percent of the students at Ft. Eustis are there to learn about the helicopter.

Engineers at the U. S. Army Aeronautical Depot Maintenance Center (ARADMAC), Corpus Christi, Tex., have designed a complete maintenance-repair facility for UH-1H Huey helicopters, to be built and staffed by the Republic of Vietnam Air Force. It will probably be located at Bien Hoa Airfield.

Dubbed "Mini-ARADMAC" the project will provide the Vietnamese with their own helicopter maintenance and overhaul plant which will perform functions similar to those ARADMAC now provides the U. S. Army.

Its design incorporates all the experience gained from the 9 years that ARADMAC has been involved in the overhaul and repair of Army aircraft.

Assignment: Berlin

U. S. Army aviators of the Berlin Brigade Aviation Detachment are limited to flying within a 20-mile circle known as the "Berlin ring"—an area of high density air traffic 110 miles inside the iron curtain

John Penman Jones

TAKE A DISC 20 miles in diameter and 10,000 feet thick, throw in three major airports and a city with a population of more than three million people and you have the flying "arena" of the Berlin Brigade Aviation Detachment.

Nearly everything concerning Berlin is unique—a city locked 110 miles inside the iron curtain—and the aviation detachment is no exception. The unit utilizes hangar facilities that were built prior to World War II and were used by the Nazi Luftwaffe during the war. And, the Army aviators who must fly in the arena have an average airborne time of 15 minutes between takeoff and landing.

Berlin is an occupied city, controlled by four powers. East Berlin constitutes the Soviet sector and West Berlin is divided into United States, English and French sectors. Air traffic into and around the city is controlled by the Berlin Air Safety Center which is located in

The Tempelhof Airfield is the hub for all Army aviation in West Berlin. Hangars on the airfield include those used by the Luftwaffe during WW II

The busy city of West Berlin shows a mixture of the old, the new and the restored

the Allied Control Authority Building in West Berlin. The center is the hub of the 20-mile circle and has representatives from all four countries. All flight plans must be cleared by the center and, consequently, by the four powers.

Free world air traffic to Berlin is authorized along three 20-mile-wide corridors from West Germany. The corridors meet to form a 20-mile circle at Berlin, known as the "Berlin ring." It is within this ring that the aviation detachment must fly and, because of commercial and cargo air traffic, the unit normally operates below 2,000 feet. Rotary wing aircraft activities are confined to the ground boundaries of West Berlin.

The unit has eight aircraft assigned: five UH-1Bs, one U-8, one U-6 and one Bird Dog. There are 10 aviators assigned and the unit currently supports five Category B aviators. There are 10 maintenance personnel authorized.

Home base for the detachment is Tempelhof Airport, a key hub of German aviation activity during the war and, later, the main airport utilized during the Berlin airlift. The Berlin Airlift Memorial at Tempelhof serves as a reminder of the trying months in 1948 and 1949 when all the vital supplies for the entire city had to be airlifted from the free zone. The communists had blocked all surface routes into the city, but in 15 months the Berlin airlift moved more than 2,330,000 tons of food, fuel and other supplies to Berlin.

The mission of the Berlin Brigade Aviation Detachment is to provide general aviation support for the U. S. and allied forces in Berlin. The British and French do not now have any rotary wing aircraft.

The unit has provided aerial transportation for then Vice-President Hubert H. Humphrey and other distinguished government visitors.

During President Richard M. Nixon's 1969 visit the detachment's helicopters were again called upon, this time to relay microwave television signals of the President's visit and to support news coverage.

Among the more unique missions flown by the unit are requests to hover over radar domes to blow away snow threatening to collapse them. Another unusual requirement is regular flights to Steinstucken, Germany.

Just as Berlin is an island in a sea of communism, Steinstucken is a West Berlin enclave that is isolated from the rest of the free sector. Using much the same tactics as they did with the Berlin blockade, the communists implemented a program of harassment for the people of Steinstucken. They cut off surface routes from West Berlin to the tiny suburban community, apparently hoping the enclave would be absorbed by East Germany. Their scheme didn't work and the aviation detachment was given the responsibility of supporting military police who represent the U. S. commitments to Berlin by their presence in the area.

Because of various regulations —some U. S. and others international—the services rely on multiengine aircraft to fly the corridors to West Germany.

The detachment is selective in

Looking from west to east, the wall in foreground bisects what once were main arteries of transportation. Trolley car tracks are severed and provided with abrupt turnabouts

assigning personnel and all aviators must have a standard instrument ticket within 8 to 10 months of arrival. Tactical tickets are not accepted. Instrument IPs and examiners are brought into Berlin from the 15th Aviation Group, headquartered at Schwaebisch Hall, Germany. The unit has a Link trainer and conducts instrument flight training within the ring.

In addition to the daily surveillance, administrative and special requirement flights, the unit conducts regular airmobile training operations with ground troops. Also, each year allied aviation units bring aircraft to the "island" city and joint maneuvers are held.

The detachment is consistently a top unit in aircraft availability and its safety record is comparable to that of the Presidential Flight Detachment.

The second accident in the history of the unit occurred as a result of a power failure on 29 September 1969, ending an accident-free record of 16 years, 362 days. All four persons aboard the UH-1 escaped injury but the aircraft suffered major component damage. The detachment's record up to the time of the accident was a total of 25,477 flight hours, 115,437 landings and takeoffs, with three engine failures and eight emergency landings.

During 1969 the unit flew 1,619 hours for 1,458 missions with 4,761 landings. The aircraft carried 4,675 passengers and 56,435 pounds of cargo.

The men of the Berlin Brigade Aviation Detachment have added a new dimension to the Army aviation cliche "low and slow." In Berlin it's "low, slow and short" but "long" on exposure.

The Church of the Reconciliation is barricaded from its parishioners. Only the facade of what once were stores and buildings now remain as a part of the infamous wall

Pressure differences on each side of the thin tympanic membranes can cause a feeling of fullness in the ears, decreased hearing acuity and either a gradual or sudden onset of pain that can be unbearably intense

The Dangers Of An Ear Block

Provided by the Society of U. S. Army Flight Surgeons

To the crewman: Nearly everyone who has flown in an aircraft, ridden in a fast elevator or driven up a mountain has experienced an ear block.

Most of us equate this condition with a feeling of fullness in the affected ear, decreased hearing acuity and either a gradual or sudden onset of pain that can be unbearably intense. It has been compared, aptly so, to the excruciating torture of driving a pencil deep into the ear against the eardrum. Every child with a cold and earache has similar pain. It's no wonder they cry.

Few aviators appreciate the real dangers of an ear block. They extend far beyond pain. The thin tympanic membrane that detects and vibrates with sound and is richly endowed with nerves is subject to *rupture*. This occurs when the pressure differences on each side are too great. Severe pain precedes rupture by only a small difference in pressure.

Normally, a ruptured eardrum heals by itself, but the aviator will be grounded for many days. If it doesn't heal it can be a long time before he flies again.

Aeromedic

When significant pressure differences exist across the drum, fluid accumulates behind the drum and in the middle ear. If the aviator has a cold, a serious middle *ear infection* can result. It's very similar to a child's ear infection. Again, he will spend considerable time on the ground.

Army air crewmen seldom realize the potential hazard resulting from relatively small changes in altitude. An air crewman descending from 4,000 feet to sea level experiences a change of pressure just greater than 100 millimeters of mercury. With normal ventilation of the middle ear cavity, usually done by swallowing, yawning or performing the valsalva maneuver, this pressure change is well tolerated. However, due to the unique structure of the Eustacian tube, the communication between the middle ear and the back of the throat, failure to actively clear the ears on descent can result in "locking" of the Eustacian tube when only 80 to 90 millimeters of mercury pressure differential is experienced. Air crews not familiar with this fact can experience various degrees of discomfort, pain and prolonged disability from this completely preventable occurrence.

Perhaps the most serious but fortunately rare problem associated with ear block is *pressure vertigo,* or known to your flight surgeon as alternobaric vertigo. Inability to equalize the sudden changes in ear pressures during rapid ascents and descents (autorotation) may stimulate the ear's balance organs or semicircular canals. The end result is vertigo, disorientation and confusion, which can last for 10 to 60 seconds—and lead to you know what!

The remedy for all of these problems is simple: *prevent them.* Do not fly with a cold. If you can't clear your ears on descent, go back to a higher altitude and start down slower keeping your ears cleared ahead of the pressure changes. Chewing gum sometimes helps.

If you have an ear block, get over to see your flight surgeon.

To the flight surgeon: Alternobaric (pressure) vertigo has long been recognized in people undergoing altitude chamber indoctrination and in deep diving or hyperbaric chambers. Its rarity in aviators is fortunate, but is usually disastrous when it occurs. In six recent cases involving aviators, two terminated in accidents with fatalities.

The specific cause of alternobaric vertigo is at present unknown. Somehow a pressure wave of low frequency is transmitted to the vestibular or semicircular balance system, perhaps through the round or oval window. This phenomenon is a real hazard and threat to patients who have had middle ear surgeory, i.e., fenestrations, stapedectomies or reconstruction of damage caused by trauma.

A careful ear, nose and throat exam will detect early problems. A continuing program of unit education, utilizing your senior and experienced aviators to assist, will repay in a most unusual bounty of dividends—no problems.

Encourage prevention, instruct the proper method of clearing the ears (many never learn), rely on nasal sprays or inhalers if, and only if, the mission must be flown. Keep treatment while flying topical, not systemic.

PATHFINDERS

Close coordination between air and ground units is essential to successful airmobile operations. Coupling 30 years of combat experience with today's advances in technology and technique, the pathfinders provide this vital link

ON A BRIGHT AND sultry morning in the Republic of Vietnam a flight of UH-1 helicopters, heavy with infantrymen, winged its way across the mountains and rice paddies toward a small jungle clearing that would be used as a landing zone (LZ) in a combat assault.

Ahead, tac air and artillery "prepped" the LZ to eliminate any enemy in the area. The prep was followed by a pass of HueyCobra gunships as a lone chopper with four pathfinders on the skids came in to hover over the LZ at a height of 30 feet. In a matter of seconds the pathfinders had rappelled down dangling ropes into the area and scrambled into the cover of the trees on the edge of the clearing to set up a perimeter. Before the last man had hit the ground, bullets from an enemy AK-47 began ripping at the helicopter. The door gunner sprayed the surrounding trees with a wall of lead as the ship struggled to escape.

As the enemy fire was silenced, the pathfinders quickly cleared an area large enough for one ship to land safely. Then, with a coolness that came from having done his job many times before the team leader ignited a smoke grenade in the clearing and radioed the flight leader.

"Blue Lead 2-5, this is Black Hat 1, over."

"Roger Black Hat 1, this is Blue Lead 2-5."

"Blue Lead 2-5, do you see my smoke?"

"Roger, I see red smoke Black Hat."

"That's right Blue Lead, the LZ was hot—one sniper eliminated—and only big enough for one ship. The wind is out of the northwest at about 5 knots. All the firing came out of the north and the east, so you might want the gunships to hit that area while you unload."

"Black Hat 1, this is Blue Lead 2-5, roger that. Number one will begin his approach now."

As the first ship made its way to the colored smoke marking the LZ, the pilot and his crew were listening to the conversation between the pathfinder on the ground and the flight leader. They could see the team leader standing in the clearing guiding them to the spot where the troops would disembark.

HueyCobra gunships were firing rockets and miniguns northeast of the LZ in an effort to keep any enemy busy while the troops unloaded.

"O.K. number one, you're looking good," came the calm voice over the headset. "The wind is still steady at about 5 knots."

Without replying the pilot set the ship down to about a 12-inch hover while the soldiers dashed for the trees. The ship was in and out of the LZ in a matter of seconds. The second ship had already begun its approach.

Ship after ship dipped into the jungle clearing, unloading their precious cargoes, until an entire company of infantrymen was inserted and ready to engage the enemy.

As the last ship unloaded, the sergeant and his team of highly trained pathfinders jumped aboard the aircraft for the trip home. Their job was finished; they had successfully done their part in coordinating the most critical moments of a combat assault, without a single casualty. Had a helicopter crashed in those hectic minutes they would have organized a rescue operation, closed or restricted the landing site, called for medevac and kept an open radio

A UH-1 is guided into a confined LZ atop a mountain in the Republic of Vietnam

net to advise the commanders of the situation.

These men did their job well because they are a product of a quarter century of U. S. combat experience. In that time they have come a long, long way. The very existence of this separate breed of combat-ready soldiers called pathfinders can be traced to the airborne invasion of Sicily in 1943.

In that year, paratroopers of the 82d Airborne Division landed as far as 40 miles from their assigned drop zones. Although dispersed, the drop caused confusion in the German rear areas, allowing enough time for the paratroopers to reorganize and accomplish their mission. It was apparent to the commanders in their evaluation of this mission that a positive means of marking drop zones and guiding aircraft to these zones must be developed. Thus, the pathfinders were born.

In 1944 a pathfinder school was organized in North Witham, England. Its mission was to train volunteers from the 82d and 101st Airborne Divisions as pathfinders for the invasion of Normandy. They adopted the flaming winged torch to symbolize their mission of lighting the way for the airborne.

After successfully training pathfinders for the Normandy invasion and other World War II airborne operations, the pathfinder school in England was discontinued, but in 1946 it was re-established at Ft. Benning, Ga. In 1951 U. S. Air Force combat control teams assumed the mission of providing navigational assistance to Air Force aircraft and the pathfinder school was closed again.

Following the Korean War emphasis was placed on the tactical employment of Army aircraft and Department of the Army directed the U. S. Army Infantry School to reopen the pathfinder course of instruction.

Only two pathfinder units existed in 1963. Eighteen months later there were nine and today there are 31 pathfinder units—26 of which are in Vietnam.

Today students receive a total of 285 hours of intensive training during the 5-week course before they become qualified to wear the black hat and winged torch badge that distingush the pathfinder. Course prerequisites limit commissioned officer attendance to lieutenants and captains who are assigned or under orders for assignment to a pathfinder unit. Enlisted personnel must have 9 months or more of active duty service remaining after completion of the course, an actual duty assignment requiring performance of pathfinder duties and a standard score of 100 or higher in certain aptitude areas.

Both officer and enlisted personnel must have a current semi-annual physical combat proficiency test in their 201 file with a minimum score of 350 points and at least 60 points attained in each event. They also must be qualified

parachutists and have no speech impediments. Medical records of all applicants must contain current, valid physical examinations indicating that the student is physically qualified for parachute status and possesses a minimum physical profile serial of 111111. No security clearance is required.

The pathfinder course is geared to train 400 students annually—10 classes of 40 men each—most of whom are privates. During FY 69, 367 pathfinder students were graduated with 177 of these being E2/E3. During FY 70, approximately 300 privates will be graduated. Each was hand-picked to attend the course from basic airborne classes through a very thorough screening and selection process and is normally assigned to a pathfinder unit in Vietnam upon graduation.

The training conducted during the pathfinder course covers a variety of subjects but is primarily oriented toward the three basic pathfinder missions: day or night establishment and control of helicopter landing zones, drop zones and fixed wing landing strips. The primary emphasis is on air traffic control, particularly for helicopter landing sites.

The pathfinder student is also given intensive training in means of infiltrating an operational area. Major subjects in this respect include map reading and land navigation, jumping with maneuverable parachutes and rappelling. Basic skills in communications, demolitions and the adjustment of artillery and close air support are also covered to turn out a well-rounded pathfinder graduate; and recently expanded instruction in sling load operations ensures that each man is well qualified in all aspects of airmobile operations.

The pathfinder unit is basically organized as a 15-man detachment in division/separate aviation battalions. However, this organization is being replaced by a new TOE (7-500G) that was developed by the Infantry School's airborne department in coordination with the infantry and aviation agencies of the Combat Developments Command.

The new organization takes into consideration the different composition of aviation battalions, which can provide command and control for three to seven aviation companies possessing a lift capability. Correspondingly, the TOE is based on a flexible organization of from three to seven pathfinder squads. The basic 22-man structure includes three 6-man pathfinder squads—this is geared to an aviation battalion of three lift companies. It may be organized with a maximum of seven squads with two officers and 47 enlisted men.

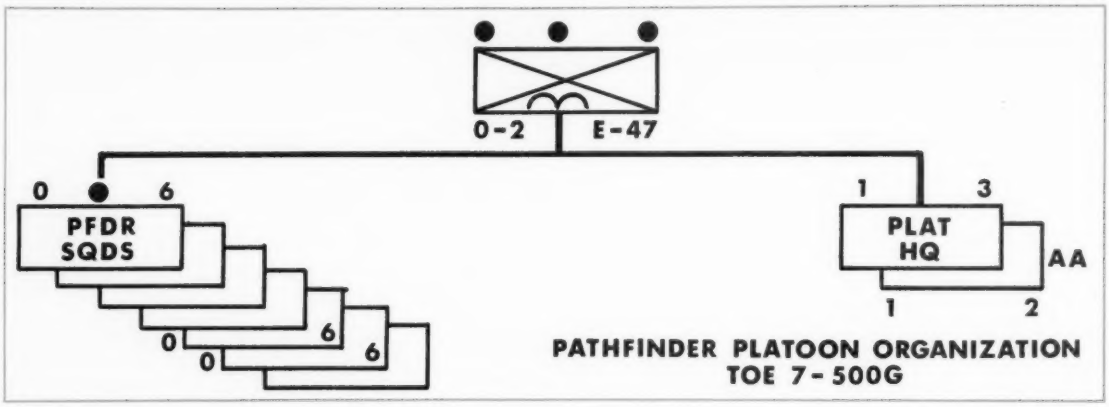
It is interesting to note that when a pathfinder reports for a mission he brings his own radios and frequencies. This relieves the ground unit of the responsibility of supplying these necessities.

Pathfinders have the specialized equipment necessary to support large and small scale, day and night airmobile operations. Examples of such equipment are: nondirectional radio beacons, battery powered lanterns, visual glide slope indicators and light guns.

The inherent value of pathfinders lies in the fact that their employment is limited only by the commander's imagination and ingenuity. The following basic services are normal functions of pathfinders, but many varieties exist:

- Air traffic control at the pickup and landing zones during combat assault operations.
- Air traffic control and rigging assistance at forward logistical and fire support bases.
- Advice and assistance to commanders on selection and control of pickup and landing zones.

Rigging techniques are yet another of the pathfinder's qualifications



PATHFINDER PLATOON ORGANIZATION
TOE 7-500G

• Guidance of aircraft through artillery and air strike zones.

• Assistance in recovery of downed aircraft.

• Presentation of instruction on rigging techniques to infantry and artillery personnel.

In the airmobile division, battalion fire support bases are often provided continuous pathfinder support. This support includes day-to-day operations as well as opening and closing of the fire bases. Pathfinders establish and operate the landing zone control radio net and handle all aircraft entering or leaving the fire base area. They also establish a direct hot line to the battalion tactical operations center (TOC) and artillery fire support coordination element (FSCE) to obtain advisories of outgoing friendly fire. The senior pathfinder works closely with the battalion commander or battalion S-3 on the establishment of aircraft traffic patterns and landing points.

Normally a team of three is needed to support a fire base. The team consists of a site commander, a radio-telephone operator and an artillery coordinator. This team accompanies the assaulting unit. Often it must be augmented by additional personnel if the base has extremely heavy traffic, or if there are a number of landing pads which cannot be observed from one location.

Pathfinders in one division-size unit alone were responsible for the ground control of 25,281 operational troop sorties and 74,648 logistical missions in a 7-month period.

In combined operations with the Army of the Republic of Vietnam pathfinders have been given an increased role in the organization and control of landing zones and pickup zones.

One example of pathfinder efficiency occurred on 5 September 1969 at LZ Ike, 18 kilometers northeast of Nui Ba Den. The 2d Battalion, 8th Cavalry was subjected to an intense ground and indirect fire attack. Several cavalrymen were wounded with one requiring immediate medical evacuation. As the Dustoff helicopter approached the LZ the pilot immediately checked in on the control frequency. The LZ control was operated by two pathfinders. They gave him a thorough briefing on the enemy situation, the approach and landing direction, information on friendly fires, warning of existing obstacles in the path of approach, the wind direction and

Equipment displayed during a field exercise typifies materials used by pathfinders

further told him that they would guide him in for a landing with signal batons.

Enemy mortar rounds were still impacting when the Dustoff helicopter picked up the pathfinder signalman's light batons and was guided in safely behind a bunker. As soon as the wounded men were loaded aboard the aircraft the pathfinder's signals again guided the helicopter from behind the bunker and effective pathfinder instructions provided him the best departure route based on current enemy activity and friendly fires. The pathfinder signalman himself was wounded by mortar fire during the operation and was later evacuated using the same techniques previously discussed.

Another example of pathfinder operations occurred in June 1969 in III Corps Tactical Zone when a new LZ was opened. The unit establishing the LZ did not have pathfinder support and had only an inexperienced organic LZ ground control element. No attempt was made to establish a separate radio frequency for controlling helicopter support traffic.

Since the command frequency was fully utilized in the control of ground operations, the CH-47 helicopters arriving with ammunition, barrier materiels and other supplies were required to orbit, awaiting information on the tactical situation, direction of friendly fires, other air traffic operating in the area and specific unloading points. In addition to unnecessarily subjecting these critical aircraft and loads to enemy fire, valuable blade time was wasted by this lack of planning.

Fortunately, in this case subsequent coordination between the aviation unit and the ground unit resulted in the immediate establishment of a separate air traffic control frequency with two pathfinders to handle the traffic. The pathfinders identified and recommended elimination of the safety hazards existing on the LZ. As a result of this action the safety and efficiency of critical air operations on the LZ were improved immeasurably and greatly enhanced the effectiveness of the entire operation.

Large combat assaults are made easier by pathfinder support

Pathfinder personnel also may accompany long range patrol (LRP) personnel. When LRPs find a profitable air assault target, pathfinders can be used to provide terminal guidance to a landing zone secured by the LRPs. This permits a surprise insertion without the reconnaissance flights and artillery preparations that usually warn the enemy of a pending air assault.

The key to pathfinder controlled operations is the rapport that has been established between aviators and pathfinders. The extremely complex air traffic control situations which are created during large scale airmobile operations require that the pathfinder not only possess a high degree of proficiency in combat air traffic control procedures, but also be familiar with the SOP of both ground and aviation units involved.

The pathfinder's intensive training also has given him an understanding of the pilot and aircraft capabilities and limitations. He understands the pilot's needs and what must be done to safely and efficiently accomplish his mission. Most pilots will take a "black hat's" (pathfinder) description of the LZ and his explanation of the tactical situation at face value because of the pathfinder's training, knowledge, professionalism and dependability.

This rapport is particularly critical during night operations or when ground units are in contact. It is at these times that confusion may cause errors and the need for quick accurate communication between air and ground units is of prime importance. The pathfinder provides this transition with his overlapping knowledge of both air and ground tactics.

The type of job that the pathfinder performs can only be accomplished through experience—experience that comes from hard work and the knowledge gained from a quarter of a century of pathfinder operations the world over.

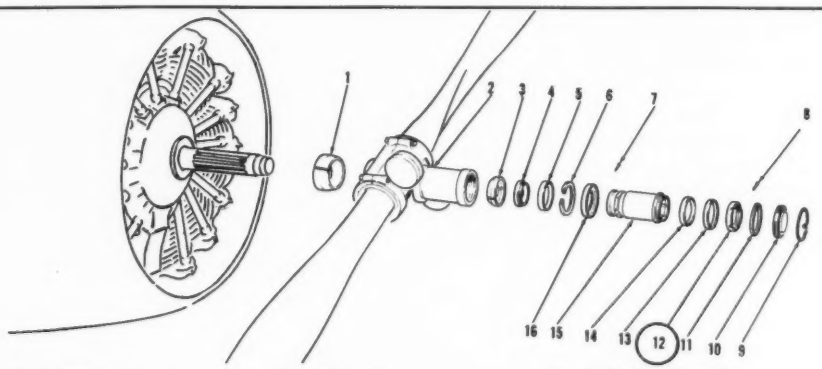
Maintenance

Box Your Tools: When performing maintenance on top of a UH-1 do not lay small tools such as sockets, ratchets, screwdrivers and dikes on the standing area where you are working. Place them back in your toolbox. The items could easily be kicked into the flight controls or engine inlet.

A Tip For U-6 People: Next time your U-6 Beaver develops an oil leak around the propeller, instead of installing a new gasket try tightening the piston gasket nut. Usually this will stop the leak. Note item 12 in drawing (below).

Check The Hoist Pump First: In case of a hoist hydraulic failure on the CH-54A Tarhe, check the *hoist pump flow switch* located on the pump before replacement. An inoperative flow switch will indicate the same as a pump failure.

Severe Lateral Vibration In UH-1H: Last year at Camp Bear Cat, Republic of Vietnam, one of the 335th Assault Helicopter Company's UH-1H model Hueys encountered a severe lateral vibration. The service platoon sergeant requested the maintenance crew to scope and sweep the main rotor blades and retrack. This action failed to bring any results. The severe lateral vibration was still there at approximately 60 knots air speed and would increase as air speed increased. The hub and blades were then balanced—still no change. Next, the main rotor dampers—no change. The transmission dampers and fifth mount were changed, the mast was pulled and a new one installed, the lateral servos were replaced and transmission bolts retorqued—this action resulted in no change. After about 2 week's work and no change in the vibration and after having checked with our direct support unit and the Bell tech rep the de-



1. Rear cone
2. Cylinder
3. Front cone
4. Front cone packing washer
5. Front cone spacer
6. Hub snapring
7. Cotter pin
8. Cotter pin
9. Cylinder head lockring
10. Cylinder head
11. Cylinder head gasket
12. Piston gasket nut
13. Outboard piston gasket
14. Inboard piston gasket
15. Piston
16. Piston lockring

PROPELLER ASSEMBLY

Matters...

cision was made to pull the transmission and complete pylon system. When this was done the mounting points were checked for cracks. None were found and there was no indication of the frame being warped so a new complete pylon system was installed. Main rotor blades and hub were balanced, scoped and tracked. The aircraft was test flown but the lateral vibration was still there. Another set of servos were installed, blades retracked and everything rechecked —still no change. By this time the crews almost refused to work on it anymore. It was definitely a hangar queen. Then a miracle happened. An old pilot, CW4 type, appeared, test flew the aircraft and when he switched the fuel control from automatic to manual operation the aircraft smoothed out. The fuel control unit was changed; this corrected our problem. The fuel control unit was not functioning properly, causing the engine to surge and, although it had not been noticed on the instruments, it also had caused the transmission to vibrate. This bit of knowledge saved us many man-hours and the government many dollars in the future, thanks to an old warrant officer who had passed on to the younger generation a better knowledge of aircraft maintenance. [While the foregoing does not present the best in maintenance practices, it does serve as a good example of the severe maintenance problems encountered in the field. —Ed.]

. . . when removing components

Keep Track Of Components: Items removed from an aircraft should be tagged with a plain tag bearing the aircraft tail number and stored in a central location to prevent loss of items until they can be replaced on the aircraft.

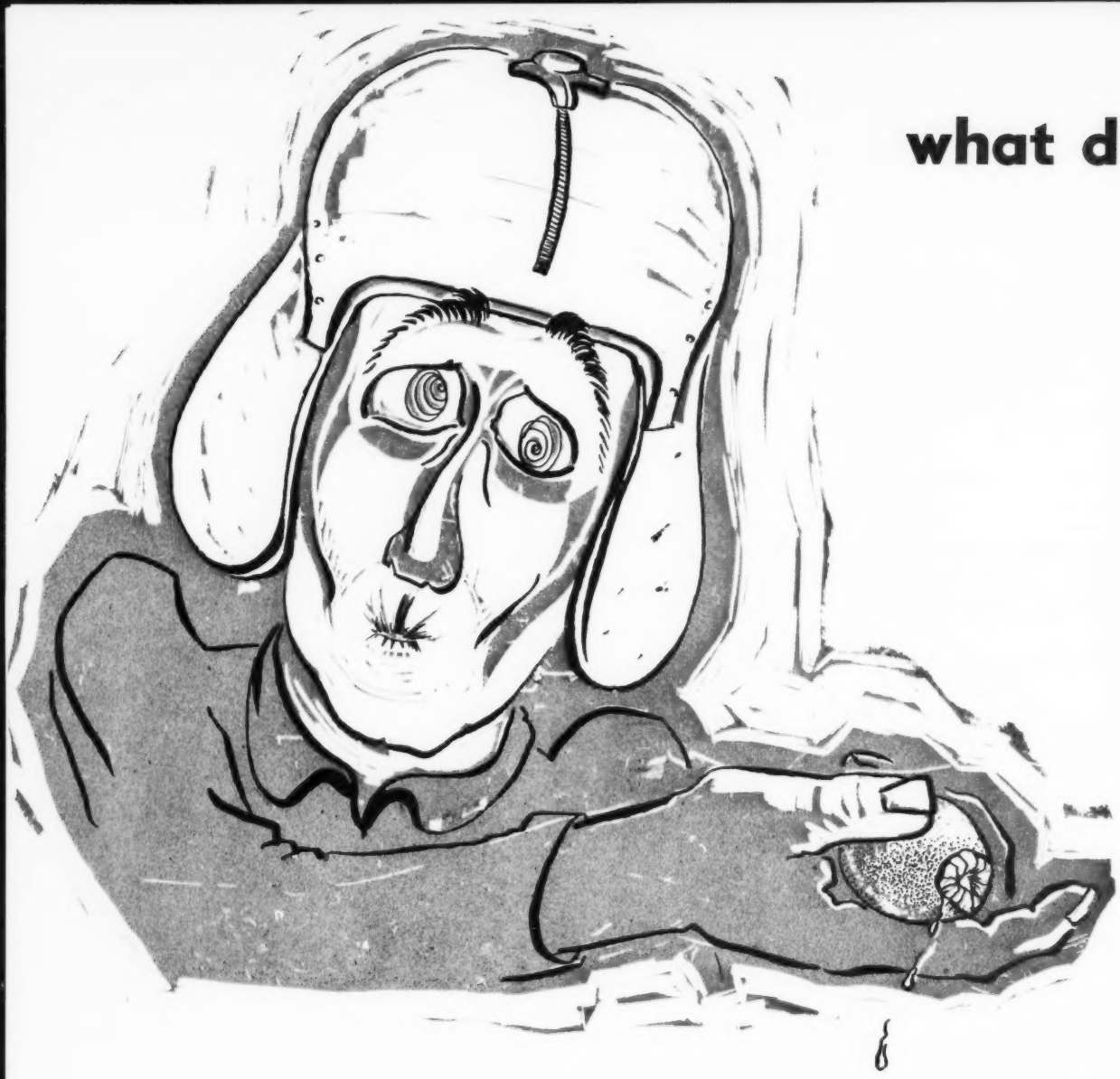
Ground Wires: To avoid accidents, damage and injuries to personnel and aircraft or equipment ground wires on aircraft or test cells in the hangar should be identified with a bright-colored streamer or flag that can be easily seen to prevent personnel from walking into the ground wire and receiving injuries. Prior to moving the aircraft or test cells they should be double-checked to ensure that no ground wires remain installed. By leaving ground wires installed on equipment when moving it the wires can break the item they are attached to or snap loose and injure personnel.

Check Your Switches On The OV-1C: Some organizations have been operating the OV-1C with the *system air supply switches* in the closed position. This disables the wing and tail deicing system, windshield wash and anti-ice system, cockpit heating, cooling and defogging capability and the ability of the aircraft to heat and defog the camera compartments, plus causing the loss of hydraulic system reservoir pressurization.

TAKE IT OFF... TAKE IT ALL OFF

Take Everything Off: All components being removed from an aircraft for turn-in should be checked thoroughly to see that all subcomponents have been removed. Example: 90 degree gearbox with the pitch change rod and quill still attached.

what did



I SAID, ALMOST all aviators, young and old, have used the term "pucker factor" to describe their feelings during times of unusual happenings. If you're not already acquainted with the term, don't attempt to find a definition. Mr. Webster doesn't mention it in his writings, nor will you find it listed as a disease in the latest medical dictionary.

Its symptoms vary with each individual. Some aviators who have experienced this phenomenon have reported heart beats with strengths and tempos much like a tail rotor in tall cane. Others speak of high frequency vibrations from toenails to earlobes. Of the latter, only a few can explain the bruises on inside portions of knees and chips of paint missing from the cyclic stick. Still others report their first symptoms as a choking or gagging in the throat area with little or no ability to swallow.

The point is that the pucker factor is something for which you as an aviator must be constantly alert. During periods of psychological and physiological stress one is apt to make irrational decisions not common to normal behavior. The

you say about

"PUCKER FACTOR?"

Experience is a good teacher, but *guided* experience is better and a prerequisite to reducing the panic point

CW2 Thomas Johnson

intent of the following is to explore some causes and preventatives of unnecessarily high or disturbing pucker factors as they relate to aviation.

An Army aviator with a total time of 220 hours as student pilot may fly his first 1,000 hours this year and never have to cope with making accurate snap decisions under stress. Then conversely he might turn out to be UH-1 Huey pilot number 13 who already has flown 500 hours and rather unexpectedly one day or night finds that his ability to control pucker factor for the next 30 seconds will dictate whether or not he finishes out those other 500 hours.

I, like many others, came into the Army with a little starched wing experience and this produced some interesting results in regard to pucker factors early in my rotary wing career. I was fascinated by the fact that this strange, noisy machine could get off the ground with zero ground run, but was relatively uneasy during my first approaches when the air speed fell below 40 knots at about 30 feet. This was a change of environment for me because this flying machine didn't fly like the ones I had been flying.

Almost anytime changes of environment are made a feeling of uneasiness—a pucker factor—is produced. But, why are some aviators terror stricken while others are simply uneasy in an identically demanding situation? The speed of environmental change is one item which will answer this question. This rate of change determines how high the pucker factor goes on the scale. Now, what scale are we talking about?

Every individual has his own scale. No two people are likely to arrive at the panic point at the same time during a slowly progressing, demanding situation. We are all born with a certain amount of level-headedness. This ability to keep one's cool, combined with experience in the situation of the type involved, is probably the most important point which kicks the individual panic line way up. Now let's relate pucker factor and environment to inadvertent IFR.

There will be a certain amount of panic involved in all inadvertent IFR situations. They say the amount decreases with instrument experience but you couldn't prove it by me. Suppose for a moment you are Huey pilot number 13 and have just gone inadvertent IFR at night in mountainous terrain while attempting to fly under the clouds. Let's freeze the action for a moment and think it over.

First, we discussed a change of environment and, friend, you have just had one. What could you have done to prevent this change, thus preventing the whole rotten mess?

During any combat situation there are risks to be taken which mean life or death, victory or defeat. You are forced many times to take such risks. The decisions are unique in that they will weigh on your shoulders alone. You are the only person who really knows your own limits. No one else can make the go no-go decision for you. It boils down to the weight of the mission against your own limitations.

Now concerning our little motion-frozen skit, did the environment have to change? Indirectly I'm asking was the mission worth it? O.K., suppose you termed the mission worth it, even though you knew it would tax your limitations, who will benefit if you have miscalculated? These are questions only you can answer and certainly are questions you should think about before the fact.

Control of environment means

PUCKER FACTOR

control of pucker factor and its results. If environment must change, at least control the speed at which it changes and remove the element of surprise.

During many night flights in the Republic of Vietnam I attempted in several ways to remove the element of surprise contingent to inadvertent IFR. Foremost was just good preflight planning. Being out in the boondocks, we didn't have a qualified weather observer nearby so I relied on flight planning information given in the form of PIREPs (pilot reports) to controllers and radar sites by incoming aircraft. PIREPs given by C-130 crews proved very valuable not only for local weather but also for a good overall weather picture in target areas.

I also attempted to work in a radar environment. This reduced the pucker factor somewhat—knowing someone out there could vector me home if the need arose. During VFR flight conditions the radar controller provided VFR traffic advisory service, helping to eliminate surprise by another aircraft operating in the same area.

There is a little good in any copilot no matter how green he may be. Even if he were only able to keep a good cross-check of the loadmeter, he proved invaluable doing just that. If he couldn't do anything else correctly he normally would be very apt at watching instruments.

If I had a suspicion that IFR conditions might lie ahead, the copilot stayed on the gauges while I went about my nightly tasks. When we actually hit the soup a simple "take controls" and "I have it" would take a tremendous load off my shoulders, leaving the way clear to make accurate and timely decisions.

Experience is the best teacher they say. I tend to disagree with that statement somewhat in that it is a little misleading. Experience is a good teacher, but *guided experience* is better. This leads us to another way to reduce pucker factor—experience.

I gained on-the-job training (OJT) experience in night missions from old hands. Each passed on a little information gained from his experience. Pretty soon I gained enough confidence in myself to take on my first missions. Experience through OJT had actually jacked up my limits to the point that I felt I could handle almost anything which might arise. But I quickly found out on my own that experience had no limit. One can never learn enough about any job. Every night posed different problems no matter how much planning was accomplished but, although each problem was new, normally it was associated in some manner or form to a tactical problem experienced in previous nights. This association ability determined whether or not I tackled the mission.

In the beginning, due to lack of experience I avoided all IFR flight at night if possible. But near the end of my tour in Vietnam weather flights were made many nights. At one point I was able to illuminate a unit in heavy contact using IFR procedures and Decca equipment for pinpoint navigation. I had tried this setup many times during daylight hours to ensure its accuracy and my skill.

We'll now return to our motion-frozen skit for the final time and perhaps its conclusion.

You should have controlled environmental change but failed to do so. You should have prepared for the unexpected but didn't, and in not doing so lost control of the speed at which it changed. Well, here we are with 50 hours of hood time for a tactical ticket and that's the sum total of instrument experience. Not much of a crutch to lean on, but that's all you have to control pucker factor in this adverse situation.

I would like to report only a near-miss in the skit discussed here, but in real life it could easily have ended in tragedy. Accident reports would probably report weather as the cause, but I wonder? How many lives have been ground out because the physical and mental abilities of the pilot and copilot were incapacitated due to fear? How many times has just one quick, irrational decision caused sorrow?

Pucker factor, although used in a slang sense, nevertheless is a term with serious implications which depend upon pre-existing mental attitudes and assumed physiological changes that may hinder good judgment during a critical period. I hope I have caused you to think seriously about it and maybe you too will prepare yourself so as to be able to use restraint when the time comes.

Remember, prevention is still the best cure.

VIEWS FROM READERS

Sir:

In regard to the article "The Soldier-Aviator" in the April 1970 AVIATION DIGEST, I would like to comment on a fine article by General Berry.

Infantry-soldier is two words as is artillery-soldier and armor-soldier, etc. Today there is no such thing as just a soldier. We are all technicians of a sort. Each focuses on the technical proficiency to make himself a professional in his field and at the same time he should use his peripheral vision to see the problems and limitations of the other technicians with whom he works. Only in this way can they relate their skill and capabilities to the whole Army.

If the aircraft is as essential to the Army as the truck, I think it is time for the other technicians to find out how steep a hill it can climb and how much it can carry going up.

I am sure there are aviators who look primarily and sometimes exclusively at their role, but there are many commanders who have not taken the time to find out what the capabilities of the aircraft that support them are and, therefore, feel they can do anything, anytime, in any kind of weather. We, as aviators, must keep in contact with the unit commanders we support and impress upon them what our capabilities, as well as our limitations, are so they may utilize their assets effectively. Maybe in this way if we do our job well they will have no surprises from us and not feel because we were unable to perform a given job we have no heart or soul.

If aviation today enjoys the respect of other soldiers it is because the pilots are professionals and work at remaining so. Let's all work together and learn each other's capabilities in advance and thereby accomplish the mission of the Army to engage and destroy the enemy.

CW3 Robert F. Morris
USAADCENFB Aviation
Biggs AAF
Ft. Bliss, Tex. 79916

Sir:

I noticed with interest your article entitled "Quick and Dirty Protection for Parked Aircraft" in the January issue, pages 26 and 27.

Revetments based on this design have been built by the U. S. Army Engineers at Long Binh and will soon be used at other airfields. Enclosed you will find photos and story on these revetments.

CPT Edward D. Florreich
HQ, U. S. Army Engineer
Command, Vietnam (Prov)
APO San Francisco 96491

• CPT Florreich's story appears in "Potpourri" on page 3 of this issue.

The photograph, below, from the April 1970 issue (page 29) caused considerable commotion in the field which resulted in several letters to the editor. It seems that the cigar-chewing maintenance officer attracted much attention and caused many readers to further scrutinize the picture for additional safety hazards and maintenance goofs.

For those of you who didn't catch the errors, take a close look and try to pick out those things which would raise the hair on a safety officer and cause a conscientious maintenance man to chew on his wrench. When you have finished, compare your list to the one we compiled from our letters:

• The maintenance officer is smoking within 50 feet of the aircraft. (Of course no maintenance officer would do that. He is just one of those stogie chewers so common to the profession.)

• The short shaft is lying behind the officer, under the aircraft. (As one reader so aptly pointed out, "Dirt and grass can't help it none.")

• No inlet covers for the engine.

• Mechanic without a shirt is risking possible sun, fuel or oil burns.

• Same mechanic should remove his dog tags to prevent entanglement with machinery.

• A hook at the right of the photo should be secured.

• The engine can at the bottom right corner of the photo should be turned over to keep it clean.

• The hose (inside the can) should have protective caps or covers.

Although some of these errors may seem rather insignificant, we at the DIGEST will be the first to agree that the value of safety and good maintenance practices can never be overstressed. You in the field can do your share to help us present safety and maintenance information to our readers by sending us the latest in the way of photos and articles.

For the past 7 years, development of a multiengine helicopter with improved performance and safety characteristics has been a joint armed forces/ civilian project. Twin turbine engines mounted on a modified UH-1H frame may be the answer

Introducing The Twin Huey

Colonel John W. Lauterbach

Project Manager, Utility Aircraft
U.S. Army Aviation Systems Command

OVER THE LAST several years the Huey has become a household word to U. S. Army aviators. It is perhaps ironic then that the newest member of the Huey series, the UH-1N, is not widely known within the Army. The reason for this lack of familiarity is twofold. First, the Army is currently not procuring the UH-1N; and secondly, any new helicopter in the military inventory remains an "unknown quantity" until operational deployment. The purpose of this article is to provide Army aviation readers with some basic UH-1N information in the area of configuration, design features and performance.

The idea of a twin Huey dates back to 1963 when a joint Army/ Bell/Continental program was initiated. This early twin was designated as the Bell Model 208 and was powered by a 1,600 shaft horsepower (SHP) Continental T67 engine. The first flight was accomplished in early 1965, and by December 1965 the flight test of the prototype was completed. All three services evaluated this prototype with favorable reports.

Although the Army decided not to procure this helicopter, Bell

continued its twin development by initiating a combined commercial and Canadian program using the United Aircraft of Canada Limited PT6T engine. Also, during late 1967 and early 1968 a U. S. Air Force requirement for a twin engine helicopter for Special Operations Force resulted in the selection of the Model 212 (Bell designation with PT6 engine). The military version was designated the UH-1N and the first production order was placed in September 1968 with production deliveries scheduled for mid 1970.

Utilizing the basic UH-1H airframe, the UH-1N evolved as a result of a number of significant design changes. Among these changes are:

• Twin engine installation: The UH-1N uses the 1,800 SHP T400 CP400 engine built by United Aircraft of Canada Limited. Basically this power plant includes two modified T74 engines and a combining gearbox with a single input into the helicopter main transmission. The combining gearbox consists of three entirely separate gear trains which are lubricated by two independent oil systems. This feature allows continued operation should one side of the gearbox receive battle damage. A torque control provides for equal power sharing between the two turboshaft units. In the event one turboshaft unit becomes inoperative, the remaining good unit will automatically compensate by advancing to maximum power if necessary. These features provide a true single engine capability. In addition to the expected performance improvements, the "Twin-Pac" provides increased operational safety by virtually eliminating the "deadman's curve" while improving mission completion reliability. The engine installation also includes particle separator, ice detectors and engine fire detection and extinguishing equipment.

• Uprated dynamics: The main transmission takeoff power rating is increased to 1,250 SHP. The power rating of the associated tail rotor gearboxes has also been increased approximately 70 percent over the UH-1H.

• Rotor changes: The two-bladed main rotor retains the same diameter and chord but incorporates a thin-tip or tapered design. This design reduces power required in both forward flight and hover. The tail rotor is the "tractor" type and uses an increased chord blade (11.5 inches).

• Crew protection: The UH-1N is equipped with a new lightweight armor seat and chin armor. The protection afforded is the same as the UH-1H armor seat, but at a substantially reduced weight.

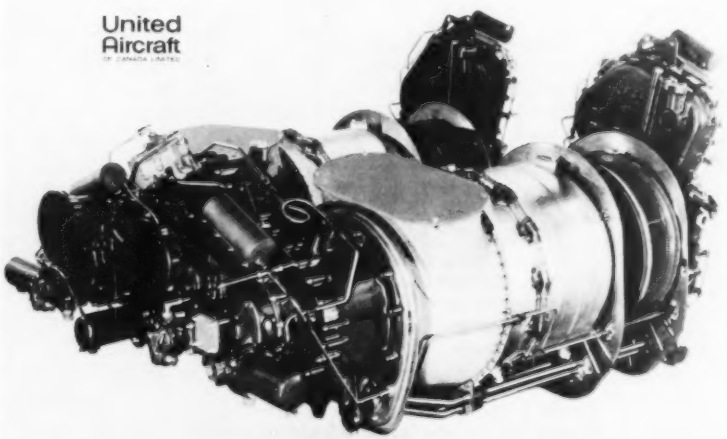
• Strengthened fuselage: The structural design criteria for the UH-1N is increased to 3.5 g at design gross weight. Crash load factors, especially as they apply to crew seats, belts and attaching structure, have been increased.

• Dual instrument panel: Although the UH-1N design incorporates features which allow single pilot flight, the instrument panel length is increased to allow a full flight instrument display for both pilot and copilot.

• Flight controls: For improved safety the UH-1N is equipped with dual hydraulic boost cylinders. The cable tail rotor control used on the UH-1H is replaced by push-pull type rods on the UH-1N.

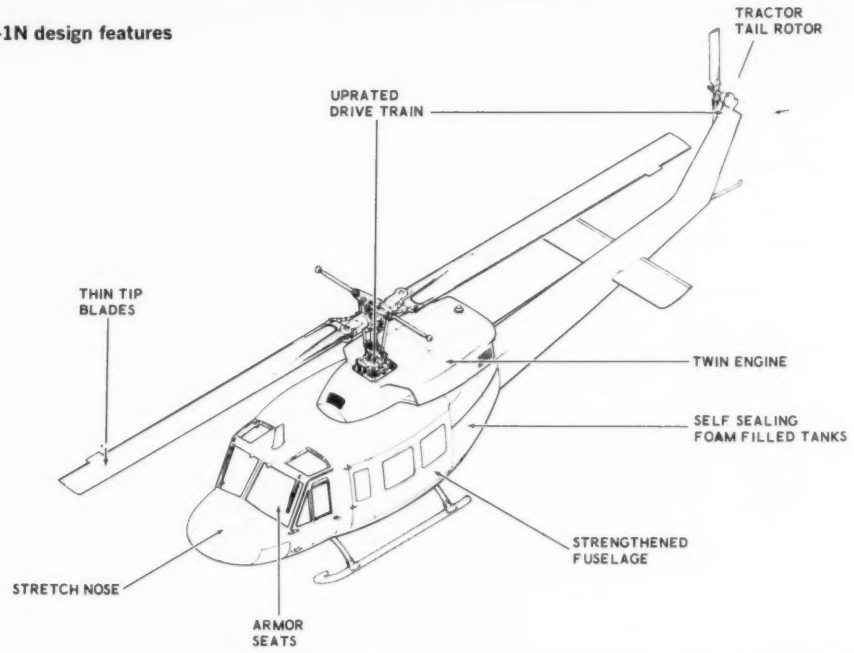
• Armament subsystems: The UH-1N includes provisions for the installation of pintle mounted 7.62 mm miniguns and/or 40 mm grenade launchers and the XM-157 rocket launchers.

To complete the configuration comparison a number of other changes should be mentioned. The UH-1N is equipped with standard lightweight avionics equipment (SLAE) in lieu of the UHF, VHF and FM radios installed in the UH-1H. Other avionics installed in the UH-1N include TACAN, UHF/DF, six intercom stations and a radar altimeter. The A. C. power capacity is increased by installation of two 750 volt-amp inverters. The self-sealing capability fuel cells of the UH-1N will be filled with fire suppression foam to reduce postcrash fire hazards. Pro-



T400/PT6T TURBO 'TWIN-PAC'

UH-1N design features



Configuration Summary

Power plant (Twin-Pac)	**UACL T400 CP400**
Intermediate rating	**1,800 SHP**
Max continuous rating	**1,530 SHP**
SFC (specific fuel consumption)	**.580**
Main transmission	
Takeoff rating (5 min.)	**1,250 SHP**
Max continuous rating	**1,100 SHP**
Main rotor	
Diameter	**48 ft.**
Chord	**21 in.**
Tail rotor	
Diameter	**8.5 ft.**
Chord	**11.5 in.**
Length	
Fuselage	**42.9 ft.**
Overall (rotors turning)	**57.1 ft.**
Width (skid tread)	**8.7 ft.**
Fuel capacity (with foam)	**209 gal.**
Seating capacity (including crew)	**15**
Cargo capacity	
Internal	**220 cu. ft.**
External	**4,000 lb.**
Empty weight (SOF configuration)	**5,960 lb.**
Max gross weight (internal)	**10,000 lb.**
Max gross weight (external)	**10,500 lb.**

visions are included to accept a number of kits to perform mission requirements. Among these are the internal rescue hoist, loud-speaker, internal ferry tank kit and external cargo kit.

With the basic design defined, the next question, logically, is how has the UH-1N's performance been improved over the UH-1H? Let's consider a comparison of hover capabilities. For such a comparison to be valid it is desirable to make a lift comparison on a payload or useful load basis to remove the bias resulting from different empty weights (see figure 1). Payload also may vary depending on number of crew, fuel load and mission-essential equipment. For this reason a comparison based on useful load is used and is made in the graph below.

The comparison reveals that under conditions of 6,000 feet pressure altitude and 95 degrees F. ambient temperature the useful load of the UH-1N is approximately 60 percent greater than the UH-1H. Under the same environmental conditions and selecting a useful load of 3,000 pounds the out-of-ground effect (OGE) hover ceiling of the UH-1H is about 3,200 feet, while that of the UH-1N is approximately 7,700 feet or a hover out-of-ground effect (HOGE) ceiling increase of 4,500 feet. In the performance categories of cruise speed, rate of climb and range the improvements are not as dramatic as that for hover. One controlling factor here is the maximum continuous rating of the main transmission which is identical for the UH-1H and UH-1N, i.e., 1,100 SHP. Also to be considered in view of the higher gross weight of the UH-1N is dynamic component fatigue life which is directly related to oscillatory loads at various air speeds. It is interesting to note that the range of the UH-1N is roughly equal to that of a UH-1H with equal fuel.

Figure 1

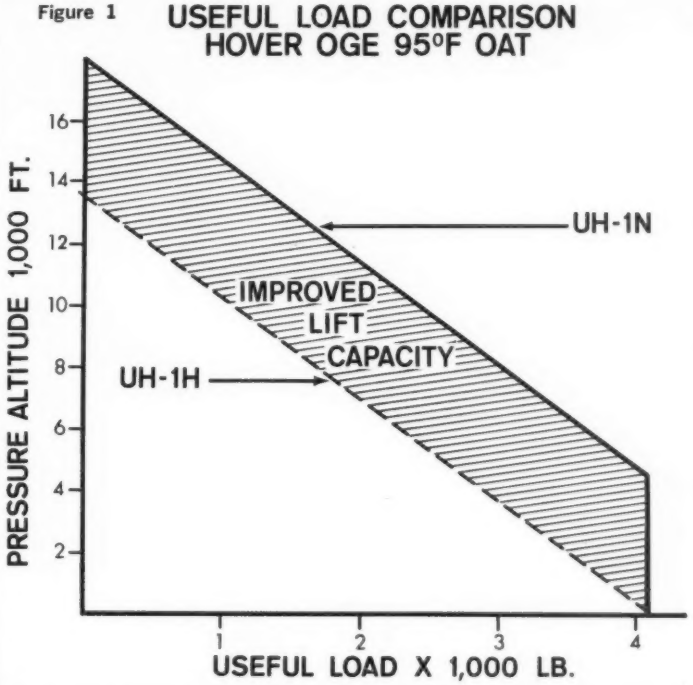


Figure 2 represents estimated performance of the UH-1N at 10,000 pounds gross weight under sea level, standard day conditions.

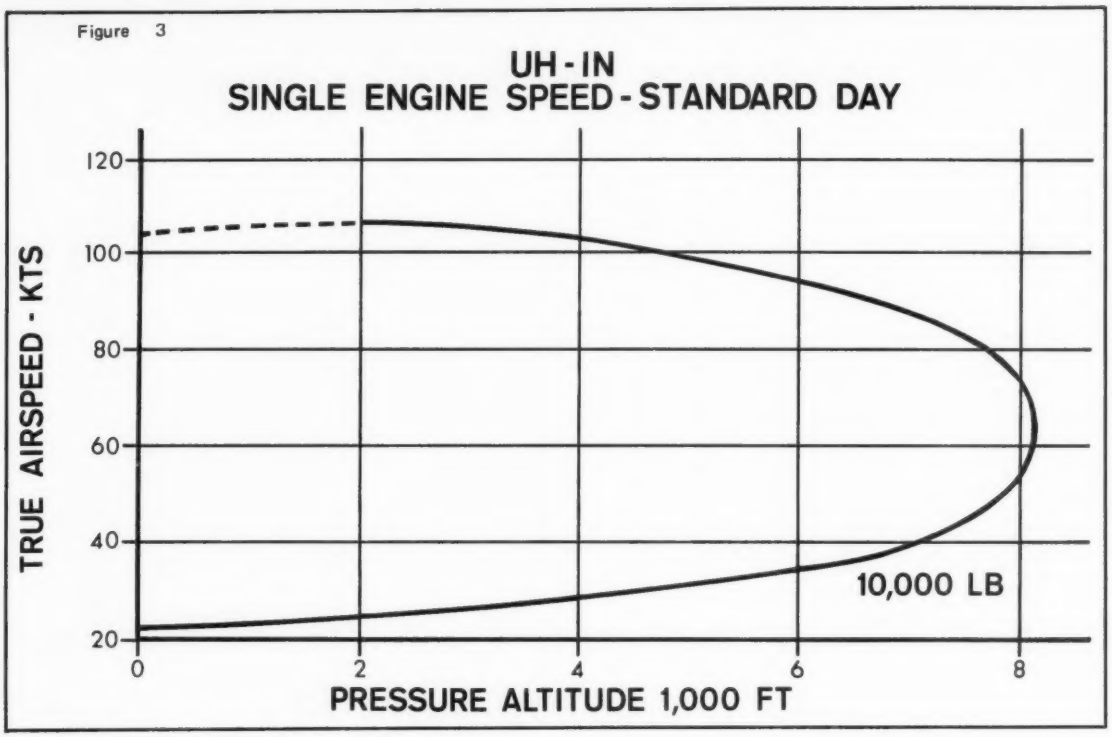
When one-engine-out performance is considered there is obviously no way to compare the UH-1N with the UH-1H. Under sea level, standard day conditions with one engine out the UH-1N is capable of in-ground effect (IGE) hover at a gross weight of approximately 9,500 pounds, and rate of climb at 10,000 pounds gross weight is 650 feet per minute. This rate of climb compares favorably with the Army's U-21 which has a sea level, standard day single engine rate of climb of 555 fpm at 9,650 pounds gross weight.

On a single engine the UH-1N at 10,000 pounds gross weight can maintain level flight in excess of 8,000 feet pressure altitude on a standard day; at 2,000 feet pressure altitude under the same conditions of temperature and gross weight a cruise speed of 107 knots can be maintained. The single engine capabilities, shown in figure 3, should be an especially attractive

Figure 2

Cruise speed	**105 kts**
Range	**259 nm**
Rate of climb (normal rated power)	**1,460 fpm**
Vertical rate of climb (maximum rated power)	**790 fpm**

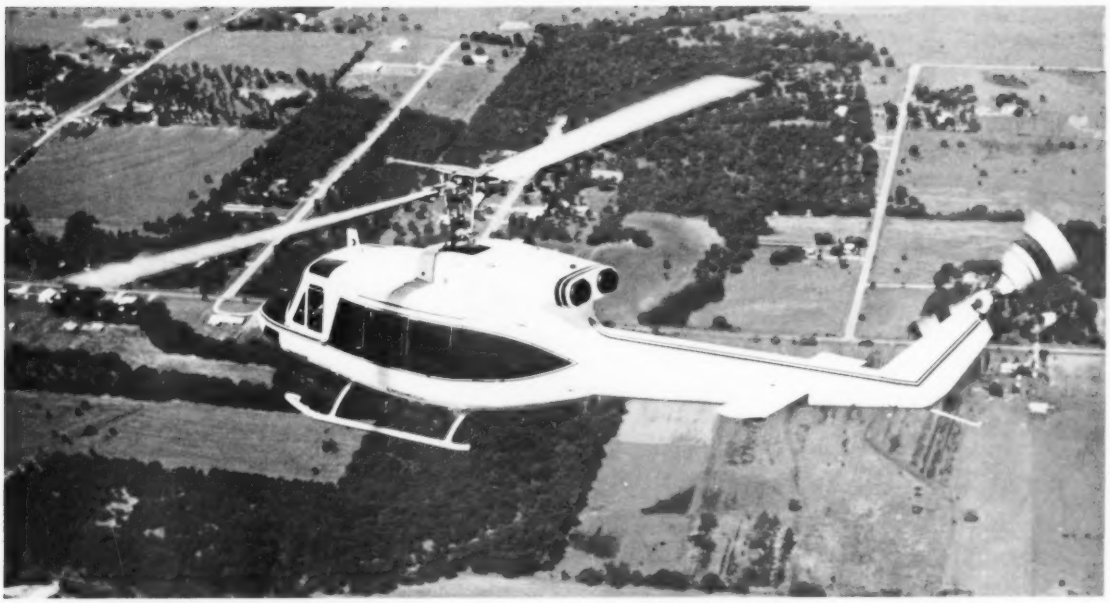
Figure 3



A portable hoist may be mounted on the military version of the Twin Huey

feature to the aviator in the field.

The introduction of a new helicopter system into the military inventory must of necessity produce some impact on the logistics system. The UH-1N is no exception, but since it is a growth version of the UH-1 series and not a totally *new* aircraft the logistics impact is minimized. The engine is new to the Huey and the drive system is a modified version of that used in the UH-1H. Both systems, however, are common to the twin AH-1J HueyCobra procured for the U. S. Marine Corps. Airframe modification to accept twin engines, to increase structural integrity and to provide other customer options necessitates many new airframe spares. Despite this unavoidable introduction of peculiar parts, the UH-1N has a sizeable



Above, one of the early Model 212 Twin Hueys. Below, a pintle mounted 7.62 minigun on the UH-1N

number of airframe parts common to the UH-1H. For military services using the UH-1 series, training of pilots and maintenance personnel should be accomplished with minimum impact.

Qualification of the UH-1N is scheduled for this year with production deliveries to follow closely. Early aircraft deliveries go to the U. S. Air Force which is under contract for 79 ships. In September 1969 the U. S. Navy and U. S. Marine Corps ordered 62 UH-1Ns with deliveries to begin early next year. A few days after the USN/USMC go-ahead the Canadian Defense Forces also ordered 50 UH-1Ns with deliveries to begin early next year. Bell had anticipated a Model 212 FAA type certificate by April with first commercial deliveries slated for the middle of this year. Early Model 212 ships are planned for delivery to high usage commercial operators to obtain in-field maintainability and reliability data as soon as possible. Early collection of this type of data will be valuable to both the military and commercial programs.

Charlie and Danny's

DEAR READERS: Another month is here but this time we have a surprise for you. At the cost of letting our mail stack up, we decided to throw some questions your way. Since most of you have at one time or another flown or crewed the O-1 or UH-1, we have selected a number of questions from the pages of TM 55-1510-202-10(O-1) and TM 55-1520-210-10C/1(UH-1) to test your knowledge of what is contained in these operator's manuals. The answers can be found on the opposite page. If you have any problems, please write and tell us.

Good luck,
CHARLIE AND DANNY

★ ★ ★

O-1 Questions

(1) How many times should a "popped" out circuit breaker be pushed in?

(2) Where is the starter circuit breaker located in the O-1A?

(3) When checking idle mixture, where is the mixture level set?

(4) If the propeller governing system failed during takeoff in an O-1D, would the resulting propeller pitch change allow the engine to develop sufficient power to make a safe takeoff?

(5) During cruising flight, if the engine suddenly started running rough, indicating too rich a mixture and normal leaning procedure did not change the condition, what other action can be taken to correct the malfunction?

(6) With the battery and drop load switches OFF, what loads will be released when the drop shackle emergency salvo switch is pressed?

(7) At what air speed will an O-1E stall when performing a coordinated constant altitude 60-degree bank turn at mission gross weight?

(8) During flight when conditions are ideal for carburetor icing, when should the carburetor air control lever be placed in an intermediate position to produce smooth engine operation?

(9) What is the recommended air speed for turbulent air penetration?

(10) What is the approximate ground run for an O-1A at gross weight (2,100 pounds) when taking off from a sod runway using 30 degrees flaps with a calm wind and temperature at +35 degrees C.?

★ ★ ★

UH-1 Questions

(1) What are the military and normal horsepower ratings of the T-53-L-13 engine?

(2) Why is the horsepower rating of the T-53-L-

Write-In

SEVERAL READERS HAVE ASKED
FOR A TEST ON THE OPERATOR'S MANUAL.
HERE'S YOUR CHANCE TO DAZZLE
YOUR FRIENDS WITH YOUR KNOWLEDGE
OF THE DASH 10

13 engine restricted?

(3) Why is the INC/DEC switch held for 10 seconds in DEC position during EMER mode manual throttle operation?

(4) Why must the main fuel be turned off prior to turning off the battery switch?

(5) With the fuel boost pumps inoperative, at what maximum pressure altitude will the UH-1 series aircraft engine-driven fuel pump maintain proper fuel pressure?

(6) What is the recommended autorotative IAS for maximum glide for UH-1D/H with a roof-mounted pitot tube?

(7) The gas producer (N_2) in the UH-1H will stabilize at what percent rpm?

(8) What is the maximum allowable torque pressure in the UH-1H?

(9) What is the maximum continuous EGT limit for the UH-1H?

(10) What is the maximum gross weight for the UH-1D/H?

★ ★ ★

Answers

All answers may be found in the following paragraphs of TM 55-1510-202-10:

(1) Once—para 2-67.

(2) Starter circuit breaker is not installed—para 2-67.

(3) Full rich—para 3-40.

(4) Yes—para 3-41.

(5) Briskly moving the mixture control lever through its full range of travel several times—para 3-65.

(6) All unarmed external loads will be jettisoned, regardless of the position of battery and drop load switches—para 6-52.

(7) 76 knots (87 mph)—figure 8-1.

(8) Never. The carburetor air control lever shall not be positioned to any intermediate position—para 10-47.

(9) 100 mph (87 knots)—para 10-61.

(10) 750 feet—figure 14-4.

All answers may be found in the following paragraphs of TM 55-1520-210-10C/1:

(1) 1400 SHP restricted to 1100 hp—page 2-4, para 2-20.

(2) Transmission limited to 1100 hp—page 2-5, note.

(3) Preclude possibility of bleed band popping—page 2-6, para 2-28, note.

(4) Main fuel valve will not close if battery switch is in OFF position—page 4-2, para 4-8(5), note.

(5) 4,600 feet—page 4-9, para 4-38(1).

(6) 99 knots—page 4-3, figure 4-1.

(7) 70%—72%—page 3-7.

(8) 50 psi—page 7-4.

(9) 625° C—page 7-3.

(10) 9,500 pounds—page 2-1.

A COMEDY...

I sensed the fear in his trembling voice and watched the color of his baby pink face melt to a sickening pale . . .

I WAS THE NEWEST pilot (2 days new) in a unit located at Hue-Phu Bai, Republic of Vietnam. The commanding officer had given me 2 days to arrange my hootch, get acclimated to the tremendous heat and humidity, psychologically adapted to a mysterious environment, take an in-country checkride and draw all my gear from supply before being scheduled on operational missions.

This was the morning, my big morning. I was scheduled to fly with CW2 Melvin Milktoast. From what I understood Milktoast was a rather shaky aircraft commander. The unit was short of pilots, so they had made Milktoast an aircraft commander. At any rate, I was scheduled to fly with him on my first day. How very unfortunate for me.

By midmorning we had flown several missions, none of which were particularly hairy. In fact, I was beginning to enjoy them. Milktoast let me do most of the flying after he demonstrated several different approaches and takeoffs. Most of the missions had been routine; however, at 1600 hours, while returning from a mission, we received a call on our fox mike with an urgent request. Milktoast told me to copy and rogered the call. The request read: "We have numerous GSWs (gunshot wounded victims), coordinates BT 817 432, call sign Alpha Foxtrot, 32 Lima. LZ (landing zone) is not secure, small arms, mortar. The gunships are on call. Rendezvous with guns over Camp Schnitzel on frequency 314.5 UHF, over."

As Milktoast gave his final "roger" the color of his baby pink face was rapidly changing to that of a sickening pale. Beads of sweat began to appear on Milktoast's forehead and upper lip. I sensed the urgency in his voice when he told me to establish contact with the gunships.

After contacting "Nasty Man 12" (the lead gunship), Milktoast established radio contact with the ground unit which was receiving small arms fire, occasional mortars and some rocket propelled grenade activity. With this information and help from "Nasty Man 12" we determined our best approach axis. Our crew chief and medic were ready and anxiously awaiting to provide what little suppressive fire they could with their M-16 rifles.

When the LZ was identified by purple smoke, Milktoast began a very rapid, out-of-trim descent from 3,000 feet. We leveled off at about 5 feet over a large area of rice paddies, and about 3/4 mile upwind of our touchdown point. The final approach was low level and at 110 knots indicated air speed. I thought it was a little fast, particularly because we were downwind. I could see the tenseness in Milktoast's face as we zipped by trees and over small obstructions. Suddenly, I felt what seemed like a rapid tapping of a screwdriver on the tail section.

The crew chief yelled, "Receiving fire at 9 o'clock."

Milktoast reacted violently. He was suddenly pumping the pedals

OF ERRORS

as if he were riding a bike. The cyclic slapped my knees and upper legs with unrelenting monotony.

Suddenly, the cockpit was a sea of flying plexiglass and debris. I tried simultaneously to grab for the flailing cyclic and tell someone we had just flown through a sapling.

Air speed was indicating 125 knots, 100 yards from touchdown. We had to start slowing or we would become part of the treeline at our 12 o'clock. Milktoast must have read my mind. He yanked the cyclic backward, bottomed pitch and added left pedal—all at once. We were sliding through the air sideways past our touchdown point as the aircraft began to balloon up and over the trees. Milktoast jammed in full left pedal and cyclic to get us back to the ground. As we began to fall through in a very unusual nose down, left bank attitude, Milktoast pegged the torquemeter with an increase of pitch that nearly yanked the rotor system clear of the mast. I noted the torque needle passing back through 52 psi. By then I was on the controls hoping only to live through the ordeal, much less land in an upright position.

The aircraft hit on its left skid, bounced up and then hit on the aft part of the right skid. I knew we got the tail stinger. The aircraft snapped forward and landed (by some miraculous deed) upright. I was a nervous wreck. "Nasty Man 12" commented on the approach and kept Charlie's head down while the crew chief and medic labored in the LZ loading the wounded soldiers. Finally, we dared to pull pitch and leave in the same direction from whence we came.

The aircraft shuddered and shook as we leapfrogged into translational lift. We stayed low until we could build sufficient air speed to make a decent cyclic climb. Once we leveled off and were clear of enemy fire I looked at Milktoast. He couldn't look me in the eye. He simply said, "I'm sorry, I guess I blew my cool."

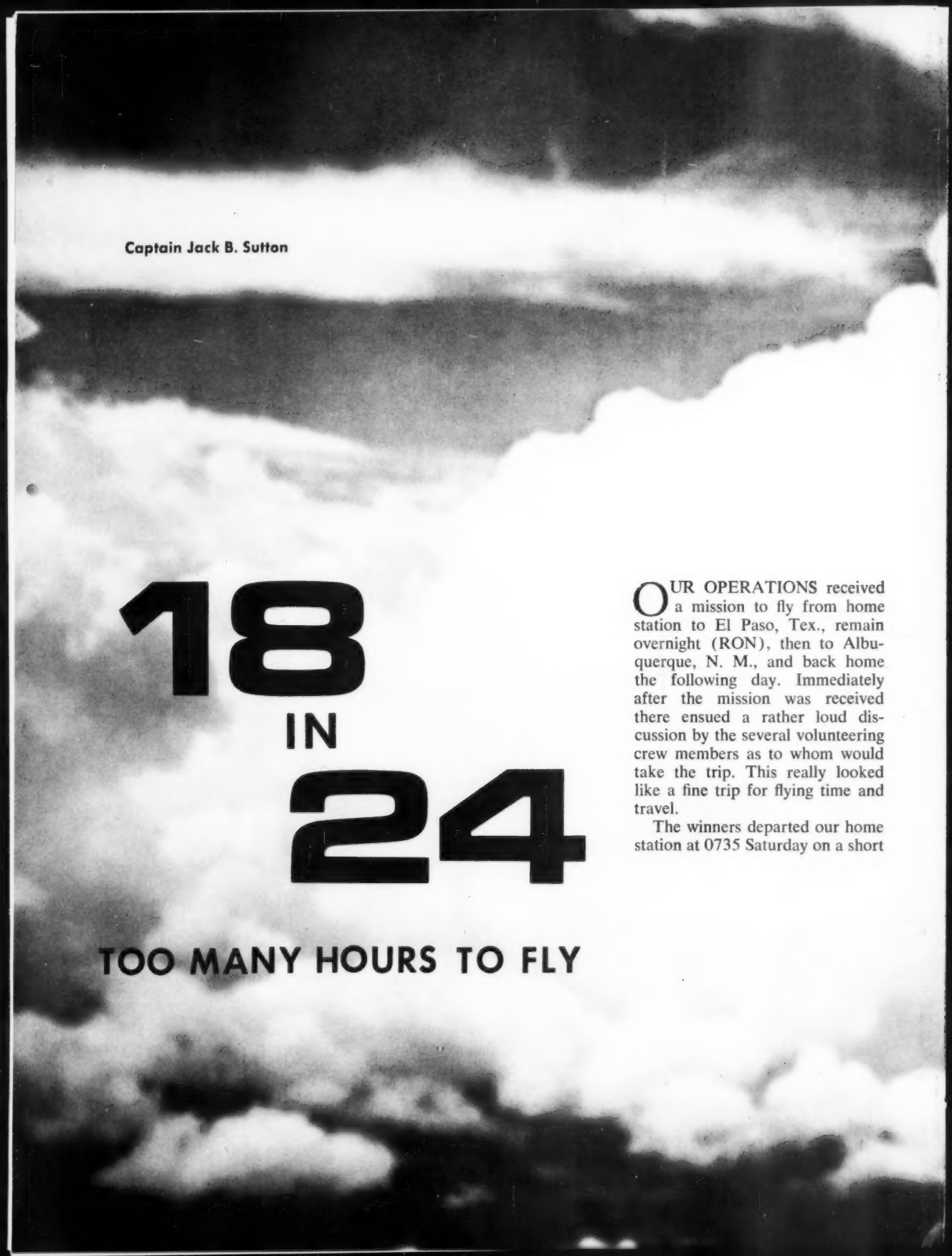
After we left the casualities at the nearest medical facility, we assessed the aircraft damage. A few hits in the tail boom were all we could blame Charlie for; at the outside, 10 man-hours of sheet metal work. However, thanks to Milktoast's inability to fly the aircraft under adverse conditions, the whole transmission and rotor system had to be replaced (no one knows how much torque we pulled, only that Milktoast hit the top stop with the collective). The skids were severely damaged, the tail boom was rippled and all the plexiglass in the cockpit needed replacing. I can't even guess the cost in man-hours and dollars, but the cost of losing that aircraft for the unit was immeasurable because of our mission.

The cause of this incident was obviously pilot error. Milktoast asked to be relieved of his aircraft commander responsibility and the commanding officer gladly obliged.

It is a known fact that much of the aircraft damage done in Vietnam, or any place for that matter, is caused by pilot error. This example exemplifies only one case where a pilot can panic. There are more:

- Think about an engine failure over water, or an inflight fire or inadvertent IFR conditions.
- Think about such conditions under which an aviator must keep his head and *fly* his aircraft.
- Think about whether or not you will be able to *fly* your aircraft.

CW2 Gene L. Fisher



Captain Jack B. Sutton

18 IN 24

TOO MANY HOURS TO FLY

OUR OPERATIONS received a mission to fly from home station to El Paso, Tex., remain overnight (RON), then to Albuquerque, N. M., and back home the following day. Immediately after the mission was received there ensued a rather loud discussion by the several volunteering crew members as to whom would take the trip. This really looked like a fine trip for flying time and travel.

The winners departed our home station at 0735 Saturday on a short

hop to arrive at the pickup point in time to load passengers and cargo by 0800. Our departure was on time and an uneventful 6-hour leg led to a planned stop in Dallas, Tex., for food and fuel.

In the middle of a very delicious meal I was handed a note from the flight service station which completely destroyed my appetite. The message stated that we were to proceed directly to Albuquerque, unload and return as soon as possible. Canceling the RON was bad, but the fact that we also had to meet a 1200 return deadline made matters worse. In my simple arithmetic this added up to approximately 20 hours of flying time. Someone had to be kidding!

Since it was Saturday afternoon at our home station no one could be reached by phone. Following our last order we refiled for Albuquerque and departed. Many unprintable grumblings and 5 hours later we were on the ground in Albuquerque. With our passengers and cargo unloaded I made haste to the nearest telephone and was able to confirm that the note received in Dallas was accurate.

The weather briefing in Albuquerque brought more grumblings because a solid line of thunderstorms 50 miles to the east resulted in a departure delay until 2100 hours. When we finally were airborne the air traffic control center's radar and our airborne weather radar enabled us to finally pick a clear spot to penetrate the line of thunderstorms. Encountering only light turbulence it looked like the rest of the leg would be rather routine. We had taken an extra pilot along because of the originally planned 11-hour flight to El Paso. This gave one pilot a chance to rest while the other two were at the controls, but if you have ever tried to sleep between two 14-cylinder engines at cruise power you know that it is impossible.

When we encountered IFR conditions about 50 miles from our planned refueling stop we put the rested pilot in the left seat. At about the same time the number two chip detector light flashed several times and finally established a not-so-welcome glow on the panel. We all could think of a million better things that could happen than a chip light at 0200 hours in IFR conditions. We reduced power and started a descent from 20 miles out in preparation for the VOR approach. Radar was not available for approach monitoring and the weather was 800 feet broken with 2 miles visibility. That was really not bad weather but it could have been a lot better for peace of mind. However, the engine kept right on churning and the pilot did his usual fine job on the approach which put us gently on the ground with a sigh of relief.

After servicing the aircraft the crew chief pulled the chip detector and the oil screens. Finally he gave us the good news—the screens were clean and there was only a minute piece of metal fuzz on the chip detector. A good engine runup and another inspection of the chip detector revealed nothing else.

More flight planning and another weather briefing put us back in the air at 0400, which was about 20 hours into the mission. The next 3 hours were idled away changing from controller to controller. At about 0700 a change from UHF frequency to 369.3 MHz was made. The center rogered our altitude, 6,000 feet, and gave us an altimeter setting of 30.12 inches Hg. My next action was to dial the digits 301.2 into the UHF radio and then call approach control, "This is Army ———— 6,000 feet, over."

No answer. Switching back to 369.3 I told the controller that his buddy was not listening on 301.2 and he informed me that that was the altimeter setting. Now to say that the crew was tired at this point would be quite an understatement.

We changed pilots for the landing and canceled our IFR clearance about 10 miles from destination. The tower approved our request for a left base and our spirits picked up at the thought of the rest we would finally get. The landing was safe (by that I mean we really couldn't be too proud of it). Touchdown was at 0735, exactly 24 hours since the mission had departed our home station.

The first person in operations with whom we talked asked what we were doing there and said we were not expected until the next day. This little gem of information brought a howl from everyone in the crew. We had flown all day and all night so the aircraft could sit on the ground and not turn a prop until 0900 Monday.

Now this certainly qualifies for a Fickle Finger of Flight award—18 hours of flight time in a 24-hour period. But, who should get the award? The crew? Maybe. We could have found some reason or excuse to stop and RON but a constant willingness to complete the mission is ingrained in Army aviators, regardless of personal opinions. Should the award go to the flight operations section personnel who laid on the mission and canceled the RON? They had received a new requirement which differed from the original mission and had simply passed the change on to us.

There are undoubtedly many differing opinions as to whom should get the award, but we will let each of you make up your own mind.

Editor's note: A look at the new AR 95-1 regarding flight time limits and crew rest might result in multiple FFF awards to the aircraft commander, operations officer and others.

DUST

Some of the problems of yesteryear are still with us today: IFR in dust. Tragic situations brought upon by existing conditions continue to beleaguer the aviator. However, through the use of proper techniques developed over nearly 50 years, one can minimize the inherent dangers

CW2 Glenn R. Locke

THE HELICOPTER, a fantastic machine, is able to operate almost anywhere since it requires only a minimum size clearing to land. This makes it different from most other flying machines. For example, one very often finds helicopters operating in and out of remote and crude airstrips or landing zones.

In 1922 George de Bothezat produced the first helicopter built for the U. S. Army. It was an enormous machine with four huge rotors which created quite a bit of dust for its military admirers. Although it did fly, the military was somewhat discouraged by its performance and walked away in tears, not only from the waste of money but also from the dust in their eyes.

Of course helicopters have been greatly improved since the days of de Bothezat's "Flying Octopus," but the helicopters of our modern Army of today still have the same problem with dust as did de Bothezat's Flying Octopus. In fact, the problem has become more serious. The bigger the copter, the bigger the blade; therefore, the bigger the dust storm.

In the States the dust problem is not very bad since most of our flying is done in and out of improved facilities which have reduced this problem. But in Vietnam a good many of the airstrips and landing zones are only temporary and have either little or no treatment to prevent dust.

During the wet season the problem is not profound. But during the dry season it can really be frightening at times making an approach or takeoff from a dusty area. At night it can become a nightmare.

When I think of dust and helicopters I recall a tragedy that I personally witnessed in the Republic of Vietnam. It occurred a few miles north of Tay Ninh. During the early morning hours a nearby fire support base was under attack. We had landed at a newly constructed airstrip and were standing by with a reaction force. There were some 20 to 30 helicopter slicks operating in and out of this strip and a continuous flow of gunships refueling and rearming simultaneously made the strip extremely

Left: Two CH-47s are engulfed in dust during a resupply operation in the Republic of Vietnam

crowded. The dust was horrible—being as much as 4 inches deep along the edges of the strip. As we watched we saw several "near misses" as the aircraft hovered around in the dust.

One particular gunship was not so lucky. While hovering out of POL the pilot went IFR in the dust. At this time the pilot attempted a takeoff, got vertigo and flew into the side of a parked slick. The gunship inverted and crashed on the strip, killing its crew chief and the pilot of the parked aircraft. Several others were injured.

So, where do we place the blame? There may have been some who were indirectly responsible such as a platoon or section leader who had not warned the pilot of the possible hazards involved while hovering in the dust and the proper procedures to be used. Or, perhaps some of the blame can be traced to a higher headquarters which had not ensured that the engineers put down a dust preventive solution. But it does not matter who was responsible. The point is the accident could possibly have been prevented if the pilot had been more careful while hovering in a potentially dangerous area.

This accident is typical of many that occur every day in Vietnam, as well as other places, as many veteran pilots will agree. According to the U. S. Army Board for Aviation Accident Research (USABAAR), there have been numerous accidents or incidents which have resulted either directly or indirectly due to dust hazards. TOO MANY!

Our section leader knew the condition of the strip and had warned us of the possible hazard. He also briefed us on the following procedures to be used when working in a dusty environment:

"When making an approach to a dusty area, make your approach to the ground. If a termination to a hover is necessary, then make it to a low hover. If in an *emergency,* it's necessary to hover the aircraft from one spot to another, shift your eyes to the chin bubble. The rotor wash will keep the dust blown away from the underside of the aircraft, therefore, making the ground visible. Hover only short distances, set down, let the dust clear and hover another short distance. The aircraft must always be kept at a low hover, otherwise sight of the ground may be lost which will lead to spatial disorientation. When making a takeoff, first set your attitude indicator and, if necessary, make a hover check. Then make a combination maximum performance/instrument takeoff until clear of the dust.

When making an approach or takeoff at night in heavy dust, the light from the landing light is reflected on the dust particles. This usually obscures the pilot's vision and creates a nerve-shattering situation. If the mission dictates that the landing is mandatory, follow the same procedures as for daytime operations—and use extreme caution."

These points, if followed, can make the difference between a successful operation and an accident of the nature just discussed.

Another condition that can be just as bad as dust is encountered when operating in and out of a burned-out rice field. The soot can really make visibility poor.

Sometimes it is necessary to operate in dusty or burned-out areas, but often there is an alternative. If a landing zone is known to be dusty and hazardous, there might be another area within a short distance that has more favorable characteristics. Always investigate the alternatives to the fullest extent before deciding to land in an area that is just waiting to engulf your aircraft in its dusty grasp.

There's another thing to beware of—that overhead air vent that has a bad habit of collecting dust or sand and then unmercifully distributing its collection into both eyes as you open it.

So remember that ole Charlie Cong is not the only enemy that you have over there. Mother Nature sometimes is. Keep this in mind when flying and it may just be the necessary insurance needed to determine if you will be there for tomorrow's mission.

Could you find him in time to avoid an accident?

"We don't have any problems here. We only have challenges."

MG DELK M. ODEN

"... do what we can to enhance the aviation safety of our aircrew members from the Navy, Air Force, Coast Guard and Army."

MG ALLEN M. BURDETT

"I have enjoyed witnessing and participating in the high degree of cooperation now existing among our services in the interest of safety ..."

RADM R. W. MEHLE

Ninth Joint Services Aviation Safety Conference

Major Harold M. Ramey
Plans and Programs Department
USABAAR

"...special mention must also be made of the spirit of interservice cooperation achieved. It was this that enabled resolution of problem areas and left all delegates with the feeling of pursuing a worthwhile goal."

BG B. H. KING

"A pragmatic, practical approach to not only identifying problems, but offering solutions to them."

COL EUGENE B. CONRAD

"I would like to thank the Army, Navy and Air Force for including the Coast Guard in the conference. We have gained immeasurably..."

CPT M. B. WILLIAMS

USABAAR WAS HOST to the Ninth Joint Services Aviation Safety Conference at Ft. Rucker, Ala., 23-27 March 1970. This conference is held annually and the host function is rotated among the participating services. Last year's conference was held by the Coast Guard at Governors Island, N.Y. The objective of the conference is: "The enhancement of aviation safety through the joint discussion and resolution of mutual areas of interest involving aviation matters which are of common interest among the United States Army, Air Force, Navy and Coast Guard." Conference purposes are:

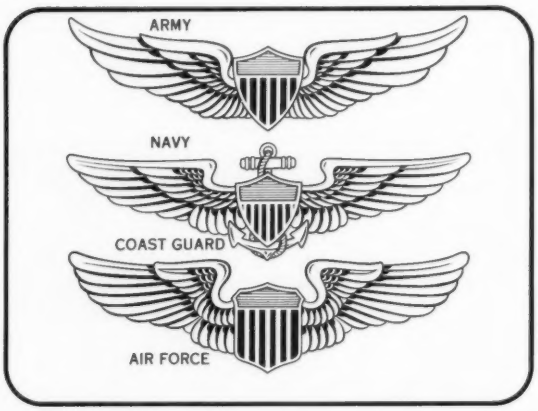
1. To provide direct exchange of information and aviation safety related matters among the conferees.

2. To provide suggestions and make recommendations on mutual aviation safety areas of concern directed toward the overall increase in combat effectiveness.

3. To conduct a comprehensive and detailed conference which may serve as a useful, informative and complete compendium of current and continuing joint aviation safety programs.

In addition to service participation, representatives from the National Transportation Safety Board, Federal Aviation Administration and the National Aeronautics and Space Administration were on hand to help strengthen service-civilian agency interface on matters relating to aviation safety. Key personnel

NINTH JOINT SERVICES AVIATION SAFETY CONFERENCE



from service contingents included Rear Admiral R. W. Mehle, commander, Naval Safety Center, Norfolk, Va.; Brigadier General B. H. King, director, Aerospace Safety, Norton Air Force Base, Calif.; Captain M. B. Williams, director of safety, U.S. Coast Guard, Washington, D.C.; and Colonel Eugene B. Conrad, director, U.S. Army Board for Aviation Accident Research, Ft. Rucker.

Major General Delk M. Oden, commanding general of the Army Aviation Center and commandant of the Army Aviation School, welcomed the guests to the conference on the morning of 24 March and commented, "We don't have any problems here. We only have challenges." COL Conrad then pinpointed the objectives of the program as "A pragmatic practical approach to not only identifying problems, but offering solutions to them."

Keynote speaker for the conference was Major General Allen M. Burdett Jr., director of Army aviation, representing the Office of the Assistant Chief of Staff for Force Development. Prior to becoming director of Army aviation, MG Burdett was commander, 1st Aviation Brigade, Republic of Vietnam, where he was responsible for all nondivisional aviation elements engaged in the Vietnam conflict. In this capacity he was instrumental in planning joint operations which involved the use of Army, Air Force and Naval aviation. In his speech, MG Burdett cited the need for standardizing definitions and coming up with uniform reporting procedures when dealing with aircraft accidents. He also urged delegates "To do what we can to enhance the aviation safety of our aircrew members from the Navy, Air Force, Coast Guard and Army."

Mr. C. O. Miller, director of the Bureau of Aviation Safety, National Transportation Safety Board, followed MG Burdett with a speech entitled "Accident Cause Factors and Beyond." He echoed MG Burdett's desire to further aviation safety. In discussing the NTSB, founded in 1967 to submit safety recommendations to Congress, Mr. Miller briefed the audience on the organization's responsibilities and current goals. He stressed the fact that the Board must work with and through the public in order to enhance the public's appreciation for and understanding of aviation safety recommendations, in order to gain needed support for these recommendations. He explained that, although the Board has no authority to implement recommendations, by informing the public, it serves as a catalyst in the sense of informal recommendations.

Mr. Miller also touched briefly on the systems approach to safety and the importance of isolating probable cause factors (man, machine and media) as being of prime concern to the NTSB. Conceding there is much to do beyond cause factor identification, he cited the need to keep our thinking dynamic throughout the entire systems safety process.

The major portion of the conference was spent in independent committee discussion groups. A total of 26 interrelated aviation safety items were discussed within four committees, chaired by the following USABAAR personnel:

Committee 1—Human Factors; Lieutenant Colonel William H. Berner, chief, Life Support Sciences Department.

Committee 2—System Safety; Lieutenant Colonel James T. Darrah, Jr., chief, Advanced Systems, Research and Analysis Division.

Committee 3—Mishap Investigation and Analysis; Lieutenant Colonel James R. Massengill, chief, Data Center.

Committee 4—Operations, Training and Education; Lieutenant Colonel Wallace I. Baker, chief, Education and Prevention Department.

Of the 26 agenda items, seven were carryover items from the previous conference. These were:

1. Evaluation of Joint Services Medical Officers Report of Aircraft Accidents.

2. Cost of Accidents.
3. Published Descriptive Statistics.
4. Standardization of Terms of Reference and Definitions Relating to Aircraft Accidents.
5. Joint Services Safety Survey Agreement.
6. Abbreviated Medical Officers Report Form.
7. Definition of Landing Phase.

New agenda items and their sources were:

1. Injury Classification (USAF).
2. Standard Physical Examinations and Laboratory Tests Following an Aircraft Accident (USAF).
3. Revision of Ejection Definition (USN).
4. High Intensity Strobe Lights (USCG).
5. Standard Safety Engineering Criteria for Future Air-Launched Missile Systems (USAF).
6. Safety Design Goals for Helicopters (USAF).
7. Joint Services Design Handbook (USN).
8. Implementation of MIL-STD-882 (USA).
9. Fire Detection Systems (USA).
10. Multi-Service Aircraft Collisions (USAF).
11. Reporting of Accidents Involving New Production or Bailed Aircraft at Contractor Facilities (USAF).
12. Expanding Information Contained in Preliminary Reports of Aircraft Accidents/Incidents (USAF).
13. Exchange of Accident Information and Critical Flight Safety Data (USAF).
14. Joint Services Standardization of Weather Causal Factors (USA).
15. Classification and Coding of Aircraft Mishaps (USA).
16. Standardization of Aircraft Arresting System Terminology (USAF).
17. Standardization of Emergency Markings on Military Aircraft (Stanag 3230) and In-Flight Distress Signal (Stanag 3379) (USAF).
18. Midair Collision Warning Device (USAF).
19. Expanding the Scope of the Joint Services Aviation Safety Conference (USAF).

In addition to the 26 agenda items discussed, there were seven information presentations on:

1. Fire Retardant Flight Clothing.
2. Crash Resistant Fuel Systems.
3. Continuous Oil Indicator System.
4. Voice Warning.
5. Proximity Warning Indicator.
6. Leased Aircraft.
7. APH-4 Flight Helmet.

The carryover agenda items were those which require additional study as a result of previous conferences and are considered worthy of further discussion to arrive at logical recommendations.

New agenda items were selected because of their magnitude and direct involvement in the safety programs among the services. They represent areas of discussion which were considered significant enough for joint discussion to bring about joint service resolutions.

Information presentations were agenda items which had been discussed at previous conferences and closed for further discussion. However, they were considered worthy for updating at this conference by the responsible service.

While at Ft. Rucker, conferees traveled to Matteson Range to observe student helicopter gunnery training and a static display showing the various armament configurations and armed helicopters used by the Army. Personnel of the Department of Tactics briefed attendees on the various weapons systems and explained what door gunner training is designed to do. The Army Aviation Test Board furnished an AH-1G HueyCobra to show conference personnel the latest weaponry available and in use on Army rotary wing aircraft. Air Force and Navy personnel were impressed with the Cobra's ability to live and fight in the field with the ground troops and its quick turnaround time.

This year's conference was judged a success by those who attended. Some of the comments made were: "I have enjoyed witnessing and participating in the high degree of cooperation now existing among our services in the interest of safety and I trust it will continue."—Rear Admiral R. W. Mehle. "We were particularly impressed with the timeliness of the entire agenda, the facilities placed at our disposal and the very able management of the various seminars. All of these speak highly of the leadership of your U.S. Army personnel. I feel special mention must also be made of the spirit of interservice cooperation achieved. It was this that enabled resolution of problem areas and left all delegates with the feeling we were pursuing a worthwhile goal."—Brigadier General B. H. King.

Needed for external load drag . . .

Fuel Management Safety Factor

CW4 Louis Hawn
Aircraft Accident Review and Analysis Department
USABAAR

CATTLE GAP, RVN, 0400—A telephone rang in the pilots' hootch. It was answered by a tall ruddy faced chief warrant officer. "Three-sixty- eight, Roster speaking."

"Sergeant Jones at operations, sir. We have a call for three CH-54s to support the 9th Infantry at Fire Support Base Mud Flat in the Delta. Your station time is 0630, with takeoff at 0600. The truck's on the way to pick up the other crew members."

"O.K., keep the coffee hot and we'll be right along."

While this conversation was taking place, the CQ awakened the flight engineers and crew chiefs for the helicopters assigned to the mission. They dressed quickly and left for the mess hall and breakfast.

The enlisted crews arrived at the flight line at 0450 and began pulling the CH-54s from the revetments with a tug. Working with the night maintenance crew, the crews pulled the giant helicopters one at a time from the revetments and lined them up in order of takeoff. There were four men to each helicopter—one operating the tug, one inside to operate the brakes (with the APP running for hydraulic pressure and lights) and two blade walkers to ensure adequate clearance from the revetments and other obstacles.

Meanwhile, at unit flight operations, the pilots were busy with individual mission sheets, checking grid coordinates from a large tactical planning map. Their concern was with distances and refueling points at the operations area, cargo loads, forecast weather and the number and types of other aircraft involved.

CW4 Roster completed his planning and spoke to the operations sergeant. "Sergeant Jones, call the POL alert section and tell them to fill the mains and put 150 gallons in the auxiliary tanks for the outbound flight."

The pilots of each helicopter were checking their emergency radios, artillery frequencies, survival kits and signing out SOIs from the operations clerk. Roster finished his flight plan and took a long look at the hostile fire map, making mental notes of the red circles in the area where they would be flying. The flight crews left operations for the flight line at 0520.

While the pilots checked over the helicopters and made communications checks with the unit operations base radio, the aircraft commanders briefed the flight engineers and crew chiefs on the type mission assigned. They also checked with their crew chiefs about the status of weapons, C rations, water jugs and smoke grenades aboard. They saw to it that each crew member had an armored vest.

Engines were started at 0550 and the crews conducted cargo release checks and completed their runups. The flight of three CH-54s began taxiing for takeoff at 0558. Unit operations was called on FM and the operations sergeant marked the flight board for the three helicopters off at 0600 for 6 hours. After they were airborne, the flight leader called Saigon artillery for clearance through its area, south along Highway 4 at 4,000 feet. Saigon artillery reported negative fire and cleared the flight.

At 0630, the flight leader called Mud Flat on FM and reported their position 10 miles north. He requested that pathfinders, better known as redcaps, stand by with smoke during the first three loads.

At Mud Flat, the artillery officer in charge of moving the six-gun platforms and four 105 mm M102 howitzers to a preselected firing position approximately 10 miles west had been busy since 0500 securing the howitzers to the platforms and adding section equipment. One A-22 bag of 105 ammunition was strapped down on each platform. The redcaps had been busy securing and checking rigging. Each load was rigged with nylon slings and a metal clevis for single point attachment to the helicopters. They checked all slings to make sure there was one twist for each 3 feet of sling length to prevent sling load vibrations which might be transmitted to the CH-54s and cause reductions in air speed en route to the new site.

At 0640, the three CH-54s went into trail, with approximately 1 minute between each helicopter. The flight leader requested smoke be popped on the first load, then busied himself completing the prelanding and prehookup checks. Hook control was set for the AFT PILOT position. Roster told the crew chief to start the hook down on short final. Ground control called to report smoke was out and Roster acknowledged.

There were two men on top of the first platform to be loaded. One held the clevis while the other reached for the hook as the helicopter came to a hover over the load. "Come right, come left, go back and come forward," were heard as the crew chief

FUEL MANAGEMENT SAFETY FACTOR

directed the pilot for centering over the load for a quick hookup. After the pilot heard the crew chief say, "We're hooked, hook coming up," he knew the hookup crew had departed the load and waited to hear him say, "You're centered, take it up," before requesting takeoff clearance.

While this was going on, there was considerable flight activity around Mud Flat. UH-1Hs were taking off to precede the Cranes to the new location so redcaps would be on the ground before the guns reached the new site.

Before takeoff, Roster checked the engine pressure ratios (EPRs), torque and winch load indicator, noting that the load on the hook weighed 15,000 pounds. He received departure clearance and gave the pilot a thumbs-up sign.

The pilot made a smooth climb to 3,000 feet at 60 knots. When he leveled off at this speed, he saw the winch load indicator had reached 20,000 pounds and the performance indicator was reading in the red. He cross-checked his power on the EPR gauge and determined that the needles were below the bug setting for dual engines. The fuel flow meter reading was high for in-flight conditions with a 15,000 pound load.

Roster told the pilot to reduce speed to bring the performance indicator back into the green arc. He started a slow deceleration and the winch load indicator again read 15,000 pounds, with the performance indicator needle in the green, as they reached 30 knots.

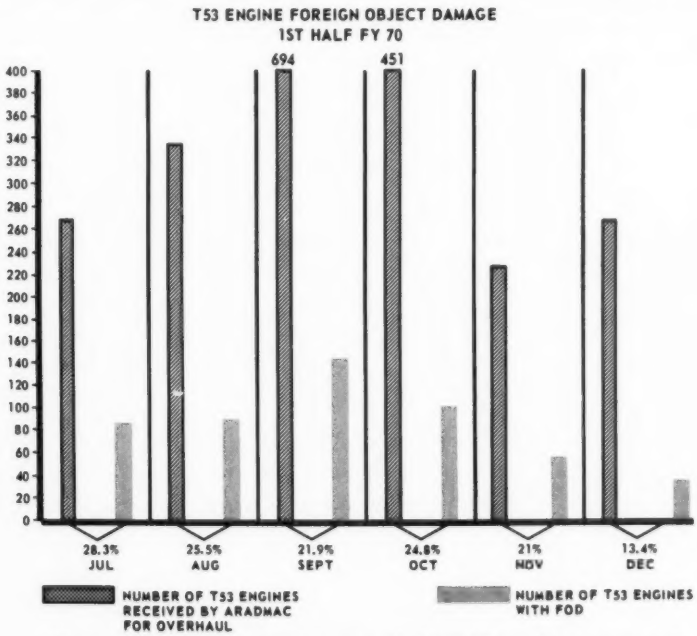
After about 20 minutes, Roster pointed down and the pilot started his approach to the new fire support base site in the Delta. There was no dry land in sight and the redcaps were standing in 4 feet of water. Green smoke was rising from beneath the surface. The helicopter was brought to a hover over the smoke, with the crew chief calling out, "40 feet, 30 feet, 20 feet, bring the aircraft down, sir."

After the pilot heard, "Load released, clear in the rear!" he made a steep climb to 3,000 feet, increased his air speed to 90 knots and flew back to the pickup site.

After they were cleared to land at the Mud Flat POL point, Roster made some mental computations of his fuel requirements for the next load. He knew his aircraft weighed approximately 23,000 pounds and the loads were 15,000 pounds each. Though the outside air temperature had risen a few degrees while

Oops— we goofed!

This chart appeared on page 60 of the May 1970 issue with the bar captions reversed. It is shown correctly here.



This chart shows the number of T53 engines received by ARADMAC for overhaul during a 6-month period and the corresponding number and percentages of engines received each month which had foreign object damage. Examples are shown in the accompanying photographs.

they were delivering the first load, he calculated the density altitude was still well below 1,000 feet. With this in mind, he reached across the console and set his fuel bugs for 2,000 pounds of fuel in each tank, assuring they would have plenty of fuel without exceeding the maximum gross weight of 42,000 pounds.

After they had landed and taken on fuel, Roster contacted Mud Flat control and called for smoke to be popped to hook up the next load. The hookup was made and the trip out to the new site was much the same as the first.

Once the platforms were set in position in a circle and connected by psp catwalks, the battery started registering the base gun and all aircraft returned to the Mud Flat POL for fuel and departure to their home bases. Aircraft commanders called their unit operations, reported their missions completed and gave their ETAs for Cattle Gap. The trip home was uneventful and the three CH-54s were soon on the ground. Overload conditions encountered during the mission were written up in the dash 13 for each helicopter. This consisted of notations of the times the winch load readings were above 15,000 pounds.

The pilots assembled around a card table in the unit readyroom to fill out their after-mission forms. CW2 Joe Woolly who flew the third helicopter was complaining about a fuel problem during the last portion of his flight. "My fuel warning light came on. I guess my ship was a fuel gulper or there was more wind than our forecast called for."

An older CW3 disagreed. "I flew with you and had the same wind. I've also flown the helicopter you flew and the fuel flow was within limits."

"Well how do you account for the fuel warning light?" Woolly asked.

"As you knew by checking your tensionometer, your load weight increased. Right? You planned your trip for 42,000 pounds gross weight and 60 knots air speed. When your weight increased, you lost air speed with the power setting you had, so you pulled in more power to hold 60 knots. The increased power resulted in increased fuel flow. Understand?"

"Yeah, I guess so. What should I have done?"

"I'd recommend you plug in a fuel management safety factor for increased weight due to configuration drag on your next flight."

CW4 Roster, who had been completing his after-mission report while listening to their conversation, looked up and grinned at the younger pilot. "Charlie's right, Joe. The loads we carry generally give us an external load drag. To counter it, we need that fuel management safety factor. Remember that and you won't have that fuel warning light glaring at you tomorrow."

guide to Aviation Resources Management
for aircraft mishap prevention
PREPARED BY THE U.S. ARMY BOARD FOR AVIATION ACCIDENT RESEARCH
USABAAR

The Guide to Aviation Resources Management for Aircraft Mishap Prevention, which supersedes the 11th edition of the Army Aircraft Accident Prevention Survey booklet, has been prepared for commanders, staff officers and leaders of the varied activities in Army aviation. If used properly, it will serve as a guide for preventing aircraft mishaps through the judicious and skillful use of aviation resources. Experience has proven that exceptional levels of sustained mission performance can only be achieved through effective management of all segments of command. Effective management will breed accident avoidance as a natural by-product. Copies may be obtained by writing: Director, USABAAR, ATTN: E&P, Fort Rucker, Alabama 36360.

Direct communication authorized by AR 15-76

CW3 Arthur R. Sobey
Education and Prevention Department
USABAAR

COMPLACENCY

KILLS

The cause of this near accident was that old nemesis of aviators—complacency! Could something like this happen to you?

THE COLONEL picked up his pen, hesitated, sighed, shook his head and quickly scrawled his signature on the document in front of him. Thrusting the offending paperwork into his out box, he leaned back and mentally reviewed the particulars of the accident which had taken up the better part of his attention for the past 10 days.

The weather was clear, with visibility 4 miles in haze and the wind was calm. Tower clearance was given for takeoff and departure on runway 27. Two minutes after takeoff, the airplane crashed and burned 1.3 miles north of the airfield. The wreckage pattern indicated impact with the ground was in a wings-level attitude at an approximate 1,000 feet-per-minute rate of descent. Preliminary analysis revealed no evidence of structural failure and both engines were developing power. The crew was experienced and well rested. Cause—undetermined at this time.

This accident did not occur, but it almost did. Had it really happened it would certainly have been a puzzler and, without a survivor, probably unexplainable. A multitude of accident investigators could have worked for weeks and probably never determined a cause. Because I'm still around, I can tell you what happened. The cause of this near accident was that old nemesis of aviators—complacency! See if you agree.

It was about 1930 when the call came to operations. Some courier material had to be delivered to an airfield 50 miles away as soon as possible. There were only two pilots at the airfield, myself and another officer who had stayed later than usual to catch up on some end-of-the-month paperwork. Since it would have taken some time to get two other pilots to fly the mission, we decided to do it ourselves. Although we had both been on duty since early that morning, the individual who was to be the pilot had not flown that day and I had flown only 4 hours that afternoon. While we weren't in danger of passing out from exhaustion, we had put in a long day and were tired. Of course, we were irritated at having to perform this relatively simple flight at such an inconvenient time.

We called the weather forecaster and he told us our destination was reporting clear, with 5 miles visibility in haze, and calm winds. The flight would be a piece of cake—20 minutes up, 5 minutes on the ground and 20 minutes back. We might still have time for a few hands of bridge before turning in for the night. Our flight plan was filed with company operations, our preflight accomplished and we completed an engine runup. After receiving takeoff clearance, we left the airfield, climbed to 3,000 feet and headed toward our destination.

The outbound flight was uneventful. We had just enough time to have a quick cigarette before contacting the destination tower for landing instructions. The pilot, anticipating instructions, positioned the airplane for a straight-in approach. About 10 miles out, I called the tower, was cleared for the straight-in approach and told to report gear down and locked. The approach was normal in all respects. The gear was lowered about 2 miles out. After checking it, I called the tower, reported gear down and locked and received clearance to land. Full flaps were put

down about 1 mile out, the props were put full forward on short final and the pilot greased it on. "Not bad for an old man, sir," I said, drawing a smile from him.

The tower cleared us to the ramp and said personnel were waiting for us. That was good news. We wouldn't have to shut down. The pilot taxied to where a captain stood waiting, swung around and throttled back to 1000 rpm on both engines. As I opened the door and climbed out onto the wing, I saw the flaps were still full down. Clutching his hat to his head and bending forward, the captain struggled through the propwash and reached the wing. Above the engine noise, we concluded our business. He left with the courier material and I stuffed the signed receipt into my pocket, clambered back inside and locked the door.

Taxi clearance was given by the tower. As we rolled toward the runway, I told the pilot the flaps were still down. As he flicked the switch to the UP position, he grinned sheepishly and muttered something under his breath. He stopped short of the runway, made a quick mag check, ran through a pretakeoff check and told me he would make a no-flap takeoff. As we taxied into position for takeoff, I noted 25 minutes had elapsed since departure from our home field. The pilot said, due to the reduced visibility, he would be going on the gauges after takeoff and told me to keep us cleared.

As we rolled down the runway, I scanned the gauges, noting all indications in the green. If our takeoff roll was longer than usual, I figured it was due to not using any flaps. After liftoff, at the pilot's command, I put the gear handle in the UP position. Within a few seconds I saw the correct indications and told the pilot the gear was up. "Are you sure?" he asked.

Realizing something must be wrong, I quickly rechecked the gear and again told the pilot it was up. "Something's wrong!" he exclaimed. A scan of the instruments showed we were climbing at 100 knots and about 200 to 300 fpm. Both engines sounded good, and the gauges showed they were still developing takeoff power. Both cylinder head temperatures were normal. All instruments and gauges were in the green, but the airplane felt sloppy and the rate of climb was far less than it should have been.

"On a routine flight in VFR conditions, we had almost killed ourselves by diving straight into the ground. What were the major mistakes? Unprofessional performance, and above all, complacency!"

The pilot rolled into a very shallow right turn and said we were going to return to the airfield and land. He told me to request clearance from the tower. I looked out the right window to clear the turn and was about to begin my transmission to the tower when I saw what our problem was. There, reflecting light from the rotating beacon, were the wing flaps, still in the full down position. Turning quickly, I saw the flap switch was in the UP position. Immediately I knew what was wrong. A flick of my wrist lowered the circuit breaker panel cover and a quick glance confirmed my suspicion. The flap motor circuit breaker had popped.

I can't recall the exact comment I made at the time, but I know it was uttered in a tone of pure disgust. How could we have been so careless and sloppy. If either of us had glanced out the side windows prior to takeoff, we would have certainly seen the flap setting. After I reset the circuit breaker, I glanced out the window, saw the flaps coming up and told the pilot what I had done. I told him the flaps were coming up and that everything would be O.K. in a few seconds. From the time the pilot rolled into a shallow right turn until I saw the flaps coming up, only a few seconds had elapsed. In fact, the airplane had turned only about 30 degrees.

A scan of the cockpit showed our air speed back to normal. The pilot was still concentrating on the instruments. Satisfied all was well once more, I slouched down in my seat and absentmindedly gazed out the window. What a stupid mistake, I thought. How could anyone be so careless. Oh, well, nothing serious had come of it and I would certainly be more careful in the future.

Suddenly my train of thought was interrupted by a red light flashing by slightly above and just beyond the wingtip. That jerk didn't miss us by much I thought, snapping erect and looking toward the rear, trying to see the offending aircraft. Seeing nothing, I turned in my seat and was reaching for the mike button on the yoke to tell the pilot of our miss when I became aware of two things almost at once. The altimeter was flashing past 200 feet and we were indicating approximately a 1,200 fpm rate of descent. Reacting instinctively, I grabbed the yoke and pulled back hard and fast. As g forces pressed me down in the seat, I glued myself to the instruments. I was aware of a blur of lights passing beneath and a feeling of sheer terror as I waited for us to crash. Then, miraculously, we were climbing. As a wave of relief washed over me, I looked at the pilot. He was looking at me with a dazed expression on his face. His state of confusion was made more apparent by his first comment, a rather shaky, "What happened?"

What happened? Well, it was rather simple. On a routine flight in VFR conditions, we had almost killed ourselves by diving straight into the ground. Why and how had it happened? We discussed this at length as we flew back to the airfield.

After takeoff, the pilot went on the gauges and remained there. During climbout he trimmed the airplane for a climb. As he started his turn, the flap motor circuit breaker was pushed in and the flaps came to the full up position. While we were turning and the flaps were coming up, the airplane transitioned from a climb to a screaming dive. How did this happen? The pilot, obviously, was not making any kind of an instrument cross-check, yet his undivided attention was focused on the instrument panel. Apparently, he had been staring at something. So much so, in fact, that he had practically hypnotized himself. Fatigue obviously had something to do with his condition. Although this was his first flight that day, he had been on duty for 14 hours prior to the incident.

As we discussed what happened, he could not remember what he had been looking at. He was not asleep in the full sense of the word because his eyes were open. He was an experienced and very proficient pilot. He took pride in his work and was one of the most dedicated, hard-working men I have ever known. He was the most respected officer in our company and was accepted as one of the more proficient pilots.

This near accident was entirely my fault. A copilot has certain duties to perform in any aircraft. On this flight, I failed to perform mine. This near accident was due entirely to lack of attention and completely unprofessional performance on my part.

No checklist was used! I should have used a checklist and called each item off for the pilot to check. His decision to use no flaps for takeoff was entirely acceptable and normal. We were using a long 4,000-foot runway and the pilot was planning to fly on the gauges. When he told me a no-flap takeoff would be made, I should have made a visual check to ensure the flaps were up. If I had, the problem would have been discovered and the whole incident probably would never have happened. Once airborne, proper attention on my part would have averted the near miss. Instead, I was sleeping at the switch and a near disaster resulted.

I would never have believed that something like this could happen. While I was looking out the window, the airplane transitioned from a climb to a dive. I was unaware of any change in gravity. *I felt nothing!* Although the horizon was poorly defined, I was looking at the lights on the ground. Daydreaming? Perhaps, but I was looking at the lights on the ground while I was daydreaming. Yet *I saw nothing!* Certainly, as the airplane assumed a nose-down attitude and air speed began to increase, there must have been a resulting increase in wind noise. Yet *I heard nothing!*

What were the major mistakes that contributed to this incident? The flight surgeon would probably conclude that fatigue and possibly smoking at night were contributing factors. I think that failure to use a checklist, gross inattention and, above all, complacency were major factors. Perhaps you feel that something else was to blame.

Could something like this happen to you? You better believe it can! Complacency is an indiscrimate killer. You can learn from my mistake.

From AEROSPACE SAFETY, March 1970

Lieutenant Colonel
Robert H. Bonner, USAF, MC
Directorate of Aerospace Safety

IS IT WORTH IT?

NEW YEAR'S EVE. The aircraft was returning to home base after a night airlift mission. The weather at home was lousy; ceiling 300 feet variable, visibility 1 mile and variable with light rain and fog. After a 12-hour round robin, with several stops, the pilot was making a straight-in ILS approach because GCA was inoperative. (All three individuals aboard had events planned for later that evening at their home station. At their last stop, the pilot called his command post duty officer and advised him he was going to get home if at all possible, in spite of the weather.)

At 3 miles from the outer marker, the aircraft was cleared to tower frequency. The tower was contacted at the outer marker and the aircraft was cleared for landing after reporting wheels down. The crew called "inner marker" and seconds later the aircraft crashed into 50-foot high trees in a wings level attitude, three-fourths of a mile short and 2,200 feet left of the runway. The aircraft was destroyed; all occupants were killed. The final evaluation of this accident determined the cause to be pilot's decision to descend below published ILS minimums and to continue the approach without visual contact with the ground.

What made an experienced air crew violate minimums? An emergency at home? No. Pressing mission requirements? No. Experience in flying instruments? Perhaps. Wanting to get home in time for a party? Probably. Get-homeitis? Definitely!

On the return leg of a flight the air crew received the existing weather at their home base as being 200 feet overcast with 2 miles visibility and fog. A 30-minute forecast predicted 400 feet overcast with 5 miles visibility and ground fog. The crew decided to attempt a precision radar approach to landing. A normal en route descent was made and initial contact with the home base RAPCON revealed that the local weather was below GCA minimums and that the only available approach was ILS. (The ILS equipment aboard the aircraft was known to be defective and was noted as such in the aircraft Form 781.)

After some hesitation and crew member discussion concerning the malfunctioning ILS equipment, the crew advised RAPCON that they would try an ILS approach and requested radar vectors to the ILS localizer. Radar vectoring placed the aircraft on ILS centerline at 1,500 feet and 9 miles out in a landing configuration. Following glide slope information presented by the malfunctioning equipment, the crew began a premature descent to landing. The aircraft

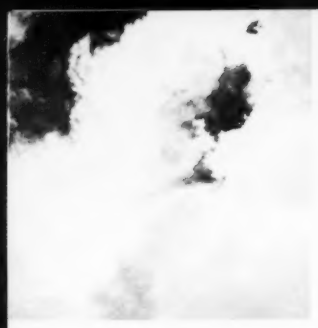
crossed the radar 5 mile fix well below the 1,400 feet listed in the letdown plate. The crew continued the descent and were surprised when the aircraft struck the water 4½ miles short of the runway.

What caused this crew to attempt an instrument landing in marginal weather with malfunctioning equipment rather than land at their alternate? Only the air crew really know. It certainly wasn't any pressing emergency at home. There was no in-flight emergency. We can only suppose that for some reason, valid or not, this crew decided to throw common sense to the winds and then attempted a procedure recognized as unsafe. Another case of get-homeitis?

An aircraft had been on a cross-country day-night evaluation and training mission. The weather briefing before the flight forecast a severe weather area through their intended route. The flight to the west coast was uneventful. The crew refueled, ate and started home. Although the severe weather forecast was valid for this leg, the crew failed to get an updated weather briefing prior to their return flight. All went well until the aircraft was over Colorado, then the crew saw thunderstorms in front of the aircraft and requested a climb to flight level 410, which was granted by Denver center. After leveling at FL 410, the crew was advised that the severe weather area was too large for radar vectoring around it. The tops were reported varying from FL 400 to 450. The crew requested FL 430 which was granted.

Initially, they were on top of all clouds but the aircraft soon penetrated a cirrus layer. Denver center reported that the area ahead did not look "real good." Air speed was reduced to turbulent air penetration speed and all anti-ice devices were turned on. FL 430 could not be maintained, due to turbulence, and a slow descent was begun. Turbulence increased and control became more difficult. Suddenly, a severe jolt was felt in the aircraft and both engines flamed out simultaneously. Air traffic control was advised of the situation and that the aircraft was descending.

During descent, turbulence, lightning, hail and rain increased to the point where the aircraft was under only marginal control. Multiple airstarts were attempted from 31,000 to 15,000 feet without success. At 15,000 feet, fire was observed coming from the No. 1 engine. It went out after the IP pulled the "fire pull" handle. At 10,000 feet, they momentarily broke out of the clouds and saw a small hole through which they could see ground lights. The aircraft was maneuvered through the hole and broke out in heavy



IS IT WORTH IT?

rain at 5,000 feet.

By this time, the batteries were dead and the flight instruments were lighted by a crew member shining his flashlight on the instrument panel. Occasional flashes of lightning provided the only illumination from outside. The IP established a glide which would enable crash landing on a highway, but because of a car on the road, the landing had to be made in a field and the aircraft was destroyed.

Why did this experienced crew elect to continue their mission in severe weather rather than turn around and find an area of more suitable weather? Overconfidence in radar vectoring around the worst cells? Perhaps. Pressing demands at the desk job the next day? Could be. Looking forward to a warm, comfortable bed at home? Possibly. Get-homeitis? Yes!

Man is a complex animal not only physically but psychologically. The above three cases, which occurred in 1969, certainly testify to that! In all three examples, the individuals were known to be intelligent, capable, well-trained and professional in their approach to flying. Yet they elected to continue flight under conditions which their training, experience and common sense should have told them were unnecessarily dangerous. What reasons could be so overwhelming to cause professionals to throw caution to the wind? At the risk of oversimplification, let's now consider some possible answers to this question.

All of us have had reasons for wanting to get to a destination. For example, many of us have a desk job which is waiting for us when we return from flying. The job could require attendance at meetings and probably deals with a lot of suspense correspondence. Could the fact that you were scheduled to brief a general officer the next morning motivate you to penetrate a thunderstorm? Could suspense correspondence which must leave your office tomorrow cause you to bust minimums? Could attendance at a conference be so important that you would press on in spite of what your common sense told you? I imagine that all of us could answer yes. Our sense of duty involving our "other" job could lead us to commit unsafe acts or more politely "take a calculated risk."

All of us, sometime in our flying career, have been disappointed by not getting home in time for a party or family gathering. Could the desire to attend a party that you had planned and looked forward to for so long cause you to take the calculated risk? This desire obviously played a role in one of the examples discussed. Have we ever done it? Yes, some of us have.

Can overconfidence in our ability as crew members let us take a chance? As we approach our destination, we are over water. We know what the minimums are and we know that the water is sea level with no obstructions; so, let's just duck under the clouds and continue our approach VFR. Perhaps we've done this before. This time, it's so dark we can't see the water until we hit it. Ouch! I think we can say that occasionally overconfidence in our ability may allow us to take chances, particularly when we have what we believe is a justifiable reason to press on.

What about our concern over members of our family? Suppose your wife called and said Johnny was admitted to the hospital after eating a bottle of aspirin. His condition is considered serious and your wife is frantic. You must get home! You reason, a father should be with his son when he is seriously ill. What father wouldn't take a little chance, the calculated risk, to be with his ill child? And so, you press on.

We have shown a problem, get-homeitis, and examined the results, aircraft accidents, and now it is time to discuss a solution. What can we do about get-homeitis?

Perhaps, the most important thing is for us to admit that it can happen to any of us regardless of how professional we are. Whatever the reason, there will be times in the future when we will be tempted to take the calculated risk.

Suppose each of us were to take a piece of paper and jot down some reasons, other than operational, why we might take a chance. Now, look at these reasons and ask yourself, Are they really worth it? Is it worth the risk to penetrate a thunderstorm so you can be with your sick child or wife? Some of you undoubtedly will say yes. But is it, if, as a result your child would be permanently without a father? Can any reason other than in-flight emergencies or operational requirements be just cause for taking unnecessary chances? Probably not, if put to the test of logic.

The final step is for us to resolve not to succumb to the temptation of get-homeitis. Let us act like the professionals we are and admit there are very few times in flying when taking a chance is really justified. Each time we are tempted, we must ask ourselves the question and answer it truthfully, Is it really worth it?

1LT Harry H. Hughes, USAF
Chief Forecaster
Det 9, 16th Weather Sqdn
Cairns AAF

U. S. ARMY WEATHER SERVICE: CAN THE AVIATOR HELP?

CAN ARMY AVIATORS assist Air Force weathermen? Should they? Answers from weathermen are a thundering "Hail yes!" and "Why not?" The typical aviator may agree that a weatherman sometimes needs help. But he is wrong. The weatherman always needs his help!

Before detailing how aviators can help themselves by helping their weathermen, let's briefly discuss the Air Weather Service (AWS). The key word is S-E-R-V-I-C-E. A major job of the worldwide Air Weather Service is to serve Army aviators. That is not an easy task, given the present state-of-the-art of weather forecasting and keeping in mind that weather forecasters work for a nonprofit organization. Here is where the Army aviator enters the picture. He certainly can, and always should, attempt to help his forecaster. Why? Because he will be helping himself at the same time. A forecaster can gain valuable information, often unattainable from other sources, by pilot reports (PIREPs). Aviators may contact forecasters directly by radio, using frequencies listed in the Enroute IFR-Supplement.

Many PIREPs aren't made, simply because the technique isn't completely understood. It's very simple. All the information a forecaster needs can be given in seconds. Here is a suggested method of reporting PIREPs over the Pilot to Forecaster Service (PFSV): Report your call sign, location, altitude, cloud bases and/or tops, turbulence and icing conditions. If you report turbulence or icing, include your aircraft type and your proximity to the clouds. Temperatures and winds aloft are also helpful. That's it. It's easy to accomplish and of great value to forecasters. Besides, it's required! Army Regulation 95-1, paragraph 4-6, states: "In-flight and post-flight weather reports will be made to requesting agencies. Any unforecast weather conditions encountered will be reported without request to appropriate agencies." Did *you* know that?

PIREPs can also be given after landing. Don't hesitate to tell your forecaster about unforecast weather that you have encountered. He'll use this knowledge to make a better forecast next time. Likewise, don't hesitate to tell him about a good forecast. It makes his job a bit more satisfying.

Remember, the PIREP you give can save another aviator some anxious moments and possibly prevent an emergency situation. Frequently it's difficult to find the time, especially in training situations, to make PIREPs. But can you afford not to? You could be on the receiving end of a vital PIREP tomorrow. Remember the word S-E-R-V-I-C-E? *S*erious *E*mergencies *R*esult *V*ia *I*dle *C*ommunications *E*quipment. Use PFSV.

When you receive your weather briefing, you'll be given the latest available weather information along with current PIREPs. Don't hesitate to ask your briefer questions. He'll be more than glad to answer them.

Forecasters often are accused of not having access to windows from which to see the current weather. Army aviators are our best windows. Don't treat the weather you encounter as *classified* information. Air Force weather forecasters have a *need to know*, but our only *access* is through YOU. We'll be waiting for your call. May we serve you?

Over 3,300 trained last year . . . Subic's jungle survival school prepares combat aviators

Army Helicopter Pilots Trained Here

J02 Mike Davidchik

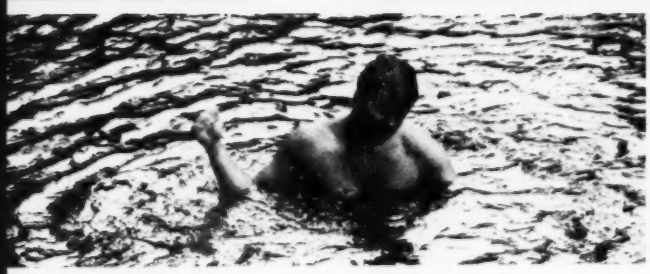
U.S. NAVAL BASE, SUBIC BAY—The increasing range of flight missions by all types of military aircraft today means that an aviator may have to bail out or be forced down in an area where he will be alone under survival conditions. What does an airman do when he finds himself cut off, in strange territory, friendless, with only what he carries and his resourcefulness to get him back?

Aviators cannot be prepared for every eventuality, but several survival schools throughout the world have been established to help them. The Jungle Environmental Survival Training School (JEST) at the U.S. Naval Air Station, Cubi Point, is designed to train aviators in the conditions they may face in the jungles of Southeast Asia.

A need for more survival training arose soon

A Negrito instructor shows an Army aviator how to weave wood strips to make twine. Several Army helicopter pilots stationed in Vietnam attended a 2-day course recently

An officer keeps the fire going under a bamboo tube containing tea made from dry leaves found in the jungle. The various uses of bamboo and the plant life that is edible are shown students at the Jungle Environmental Survival Training School (JEST) at the Naval Air Station, Cubi Point, Philippines



One of the pleasures of a 2-day campout in the jungle is the opportunity to refresh yourself in the clear, deep waters of a stream. These creeks also provide fresh drinking water for the students

A Navyman drinks from a "water vine" chopped from a jungle tree. Students at JEST are shown the various types of vines and trees that contain water to sustain life

An Army pilot bends back a branch that will spring up when the animal walks into the snare. He and the Navyman, on the right, set the trap to catch food while undergoing training at JEST

HELICOPTER PILOTS TRAINED HERE

after our commitment to Vietnam was strengthened by air strikes early in the decade. "Pilots realized that they were going to be forced down in the jungle, so they paid Negritoes themselves to teach them the way to survive," comments Lieutenant R. W. Ritz, officer-in-charge of JEST.

The school was established in August 1965 by the Survival Department of Fleet Airborne Electronics Training Unit, Pacific (FAETUPAC). Since the creation of JEST, several aviators downed by enemy fire in Vietnam have used information gained during their attendance at the school.

Primarily intended for U.S. Navy carrier pilots, JEST gradually offered courses to other personnel. In August 1968, Army helicopter pilots stationed in Vietnam were accepted. Today, dozens of Army and Marine Corps aviators are trained each week. JEST also has many nonaviators of the Navy and Marine Corps undergoing the 2-day course. These are personnel of units whose duties might require knowledge of how to survive in the jungle.

A staff of one officer and five enlisted men are assigned to the Cubi unit. But the real experts are the 15 Negrito instructors who have developed an expertise from childhood. These Negritoes live at

While relaxing in his hammock, an officer weaves wood strips into twine. Personnel of all services receive training at JEST. This soldier is a helicopter pilot assigned to a unit in Vietnam

Students wait for their steamed rice to be finished in the bamboo "pressure cooker." Rice, fish, jungle tea and some vegetables found in the jungle was the menu for these trainees during their 2-day stay in the jungle

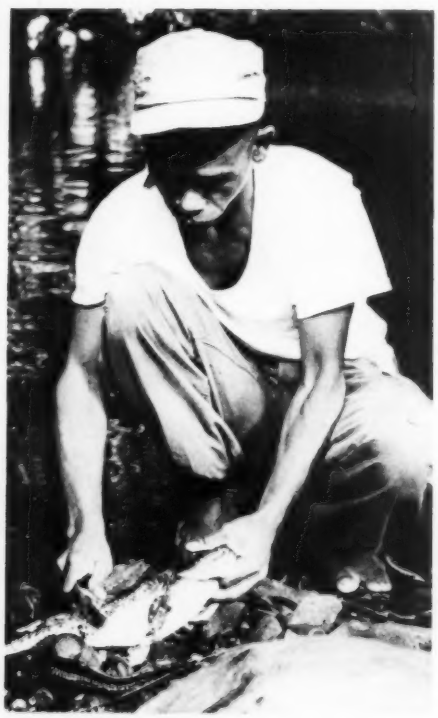
the school 5 days a week and are available around the clock. Navy personnel of JEST frequently conduct factfinding trips to Vietnam and aircraft carriers at Yankee Station to continually upgrade the course. "We are equipped to handle 65 students per week," says LT Ritz. Currently, 15 Army helicopter pilots and 25 Marine Corps pilots are scheduled each week, in addition to Navy personnel. Last year, a total of 3,327 men underwent training.

The students first see exhibits of wildlife found in the jungle at the school. They are then indoctrinated in helicopter rescue techniques and actually undergo simulated airlifts from a tower. Familiarization in the use of different types of flares is also conducted.

Accompanied by Negrito instructors, students are divided into small groups and sent into the jungle. They learn about plants and trees that can be used for water, food, soap and even medicine. The various uses of bamboo stalks are demonstrated by the instructors. The men start fires by rubbing bamboo together and make cooking and eating utensils from the bamboo. With the aid of the Negritoes, they build traps and shelters. Two nights are spent in the jungle.

"We don't expect our students to be able to live like kings when they leave us, but we feel that 48 hours of training is enough to sustain life in a jungle environment," adds LT Ritz.

Various species of fish are speared from the rocks and shallow water of the streams that meander through the Zambales jungle.
Fish, to be eaten during training, are cleaned by JEST instructor



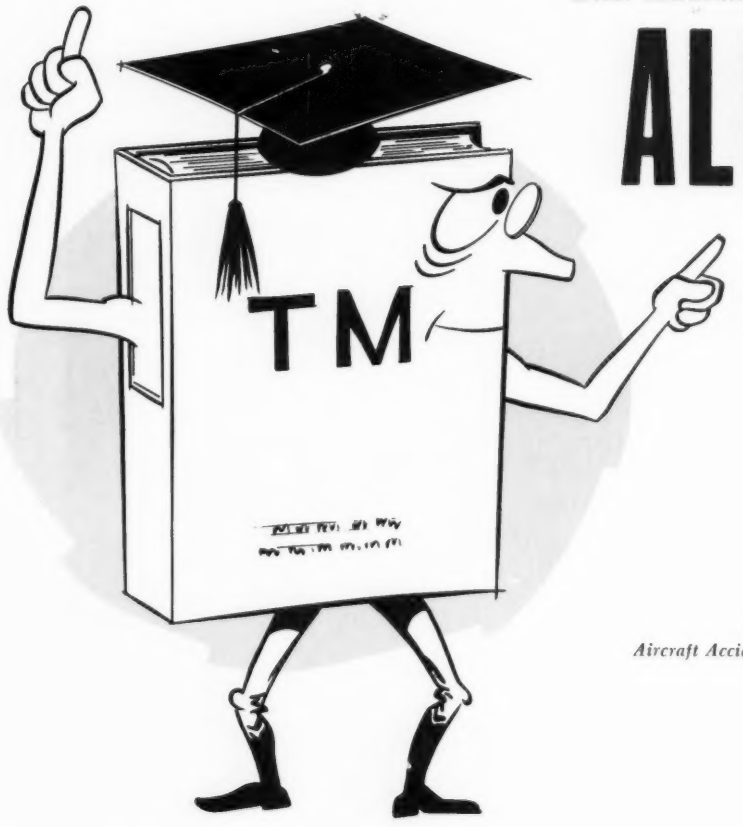
BY THE BOOK- ALMOST

THE ATTITUDE INDICATOR showed a two bar descent, there was a 2,000 fpm rate of descent on the vertical speed indicator, the air speed was 130, the altimeter was unwinding and the glide slope indicator was above glide path. "When the glide slope needle starts to move, we'll be on glide path, so change your attitude on the attitude indicator to level." The IP watched the ILS and saw the horizontal needle begin to move. There was no reaction from the pilot. "Your needle's moving, I've got it." He eased back on the wheel until the attitude indicator was level. "O.K., now settle down and you'll see the lights in a few seconds," he told himself. There was a scraping, crunching noise as the airplane struck the ground in level attitude.

What went wrong? Was the glide slope indicator or altimeter in error? Was something wrong with the airplane? No. It reacted exactly as it was designed to react. Why the crash? The IP did not thoroughly understand aerodynamics and had set himself up for an almost inevitable crash.

The instrument training flight in a light twin started from X AFB. Its destination was Bayonet AAF. The weather forecaster at X AFB forecast VFR en route with patchy ground fog at Bayonet for ETA plus 2 hours. The IP had one of the two pilots make out a DD Form 175 clearance. After checking it, he turned the form in to base operations.

"We won't have to preflight as we did when we left Bayonet," he told the pilots. "Check the oil in each engine and see that all fuel tanks are full and the caps secured. It's only the first flight of the day when you want to preflight by the checklist. Since we've already done that we know the plane's okay. Smith, you flew down, so it's Jones' leg to fly back," he told the two young officers. "You might get more training on this return leg. We may have to make an actual instrument approach at Bayonet if that fog



This article is designed only to portray a type of accident. It is not related to any particular accident

Louis H. McKenzie
Aircraft Accident Review and Analysis Department
USABAAR

forms like the forecaster predicted."

The fuel and oil were checked and Lieutenant Smith climbed into the back. Lieutenant Jones moved over to the left seat and began strapping himself in. As the IP stepped into the cockpit, he glanced at the sky and saw no clouds. "If this sky condition holds, we can expect that fog to form at Bayonet," he told the two students. "Fog forms more rapidly when there isn't cloud cover. OK Jonesy, I'll call off the checklist items and you perform them."

"Yes, sir."

"Set parking brake."

"Set."

"Battery and alternator switches."

"On."

By-the-book before starting and starting checks were completed.

"X Tower, Army 12345, taxi instructions, IFR Bayonet."

"Roger, Army 12345, taxi runway 18, altimeter 29.92, time 46, clearance on request."

"Understand runway 18."

The IP and the student set their altimeters to 29.92. Lieutenant Jones checked the clock and read 1746. He gunned the engines, rolled forward, checked the brakes and taxied smoothly from the ramp onto the taxiway. He continued toward the end of runway 18.

"Army 12345, we have your clearance. Are you ready to copy?"

"I've got it, Jones," said the IP. "You answer him and copy the clearance."

"OK, sir. Army 12345, go."

"ATC clears R12345 to Bayonet AAF via V35 Crescent City, V35W Tallapoosa, V198 Marshall, V7W Duggan, direct Bayonet, maintain 5,000."

"Understand ATC clears," Jones read the clearance back word for word.

"Read back correct. Contact tower 257.8 for takeoff."

"Roger."

The IP stopped just short of runway 18 and told Jones to set the parking brakes. The before takeoff check was completed. "OK, Jones, it's all yours."

Lieutenant Jones selected the tower frequency. "X Tower, Army 12345 ready for takeoff, IFR Bayonet AAF."

"Army 12345 cleared for takeoff, runway 18. Contact X departure control 266.7 now."

"Army 12345, roger."

The IP quickly switched frequencies. "Let it roll, Jones. I'll contact departure."

"Roger." Lieutenant Jones applied power and the airplane began racing down the runway. When liftoff speed was reached, he eased back on the wheel and they were airborne.

"Gear up."

"Gear coming up. X departure control, Army 12345 off at 56, maintaining 180 degrees."

"Army 12345, radar contact, turn right heading 340 for vector to intercept V35."

The pilot began a standard rate turn to the right and continued his climb. The flaps had been retracted and climb power set. "Not a bad student," thought the IP.

As the heading indicator reached 340 degrees, Lieutenant Jones began to roll out of the turn.

"You've overshot your heading, Jones. You're on 350 degrees. You've got to lead the heading 5 or 10 degrees. Come on, get back on 340 degrees."

"I knew I had to lead the heading, but it got to 340 degrees before I expected it. He must think I don't know how to cross-check. If I hadn't been checking manifold pressure at the time, I'd have led the rollout. Next time, I'll do it right," thought the young pilot.

As 4,900 feet indicated came up on the altimeter, Jones eased forward on the wheel and stopped his climb right on 5,000 feet. "X departure, Army 12345, 5,000 at 01." Jones began cleaning up the cockpit—power, cowl flaps, etc., checking his heading and altitude.

"Army 12345, squawk 1100, contact Jax Center, frequency 390.6."

"Army 12345, roger."

The VOR needle began to move slowly from its full left deflection toward center. The course selector was on 340 degrees with a FROM indication. "I won't overshoot again," Jones thought as he began a slow turn to the right and when he rolled out on 340 degrees the needle was centered.

"Are you going to call Jax Center?" asked the IP.

"Yes, sir, uh, I'm working on my Crescent City estimate. Would you tune center for me?"

"Jax Center tuned."

"Do it right now," Jones told himself as he keyed the mike button. "Jax Center, Army 12345, estimating Crescent City 36, 5,000."

"Roger, Army 12345, radar contact, maintain 5,000."

Although it was fairly light at 5,000 feet the horizon behind them was dark and the terrain below was getting darker. A full moon was in view and it looked like all was right with the world. The airplane droned on into the spreading darkness. The position lights and cockpit lights were on and the flight had progressed to the Mason intersection on V7W, 14 miles north of the Marshall VOR.

BY THE BOOK—ALMOST

"Army 12345, Bayonet approach control, turn left heading 297 degrees, radar vector to Bayonet locator outer marker. Maintain 5,000. Bayonet weather, partial observation, visibility 1 mile, fog."

Lieutenant Jones acknowledged and turned to 297 degrees. The training day would soon be over. Tomorrow, Saturday, he was going to the beach with June. He had looked forward all week to this weekend.

They could see the lights of Duggan out beyond the right wing. The fog at Bayonet was probably a thin local condition. The lights of Bayonet main post were a bright glow at about 2 o'clock.

A voice crackled in their headsets. "Army 61345, hold southwest of the locator outer marker, right turns, maintain 3,000. Expect approach clearance 30. Altimeter 29.85."

"Roger, how does the fog look?"

"It's down to 1,500 RVR, but it has been bouncing up and down for half an hour."

The controller called another airplane. "Army 52314, roger, hold southwest of the locator outer marker, right turns, maintain 4,000, expect approach clearance at 40, altimeter 29.85."

"Army 52314, roger, what's Duggan weather?"

"Army 52314, Duggan clear, visibility 4 miles haze, altimeter 29.85."

"Army 52314, roger, we'll hold for a bit. By the way, I can see Bayonet runway lights from here."

"Roger, 52314."

"Army 12345, Bayonet approach control clearance."

"Bayonet, Army 12345, over."

"Army 12345, cleared to Bayonet locator outer marker direct, maintain 5,000. Hold southwest of the outer marker, right turns, maintain 5,000, altimeter 29.85."

Jones read the clearance back. The ADF needle began to swing. When it reached 90 degrees, Jones eased back on the throttles, began to slow down and turned to the right.

"Would you tune the ILS for me?"

"Roger, Jones. I can see Bayonet. ILS on."

When his turn had progressed to 230 degrees, Jones and the IP noted the ADF needle on 90 degrees. Jones rolled out on 240 and punched the clock. His air speed had decreased to holding speed, 120 knots.

"Bayonet approach control, Army 12345, locator outer marker at 20, 5,000, holding."

"Army 12345, roger, expect approach clearance at 40. Bayonet presently, partial observation, 1,500 RVR."

"Army 12345, roger."

"Bayonet approach, Army 61345, request clearance direct Duggan, 3,000, over."

"Army 61345, stand by."

"Army 61345, cleared Duggan VOR direct, maintain 3,000. Read back."

"Army 61345, cleared Duggan, maintain 3,000."

"Roger, Army 61345, cleared direct Duggan *VOR.*"

"Army 61345, understand Duggan *VOR.*"

"Roger, 61345."

"Bayonet approach control, Army 52314, request clearance direct Duggan VOR, 4,000, over."

"Army 52314, cleared Duggan VOR direct, maintain 4,000. Read back."

"Army 52314, cleared Duggan VOR direct, maintain 4,000."

"Looks like we'll have to leave the plane in Duggan tonight," the IP commented. "Jones, what do you think?"

"Well, if we can't make an approach to Bayonet, we'll have to go to Duggan. I don't understand why they're reporting such poor visibility when you can see the lights from here," Jones replied.

"You're peeking, so you get pinked today," said the IP. "You'd better learn not to peek. When you're AI, there's no place to peek!"

"Army 12345, Bayonet approach control, what are your intentions?"

"Army 2345, well, I guess we'll have to file for Duggan."

"Army 12345, new weather, present visibility 3,000 RVR, over."

"Army 12345, request ILS approach."

"Army 12345, cleared ILS approach, report outer marker."

"Understand. Out of 5,000 at 30. Outer marker, inbound."

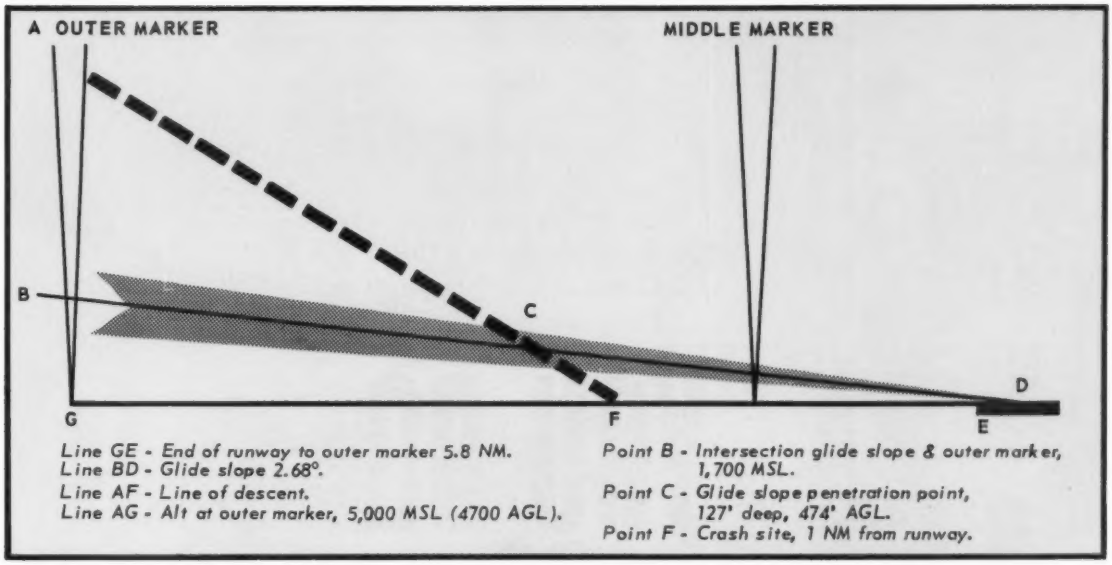
"Army 12345, understand outer marker, inbound, leaving 5,000. Contact Bayonet tower for landing."

"2345, roger."

Approximately 2½ minutes later, the crash occurred. What really happened? No one will know exactly, but several factors must be considered:

The ILS approach was initiated at the outer marker from an attitude of 5,000 MSL, instead of 2,100 MSL, as shown on the approach plate.

Factor: To determine the average rate of descent is a matter of mathematics. The distance from the outer marker and the height above the ground are known. Therefore, the rate of descent can be computed. In this case, three speeds were used—120, 130, 140. The following table shows speed, time


A OUTER MARKER
MIDDLE MARKER
B
C
D
G
F
E
Line GE - End of runway to outer marker 5.8 NM.
Line BD - Glide slope 2.68°.
Line AF - Line of descent.
Line AG - Alt at outer marker, 5,000 MSL (4700 AGL).
Point B - Intersection glide slope & outer marker, 1,700 MSL.
Point C - Glide slope penetration point, 127' deep, 474' AGL.
Point F - Crash site, 1 NM from runway.

from LOM to crash and the average rate of descent. The average rate of descent is the altitude lost, divided by the time it takes to lose it. During some phase of the descent, the actual rate must have been greater than average rate.

Speed (kts)	Time (min)	Avg. rate of descent (fpm)
120	2.41	1950
130	2.33	2107
140	1.89	2486

Factor: The glide slope angle is 2.68 degrees (see figure). The angle AFG (airplane descent line) is 9 degrees.

Factor: Point C (see figure) where the airplane intercepted the glide slope is 474 feet above the ground. The glide slope at that point is 125 feet (vertical).

Factor: The airfield could be seen from the outer marker. Therefore, during the initial phase of the approach, it could also be seen.

Assumption: The pilot was flying during the initial phase of the approach, with the IP monitoring the instruments and watching the airfield lights. The IP wanted to intercept the glide slope outside of the middle marker. Therefore, a rate of descent of 2,000 to 2,500 fpm was established. The IP instructed the pilot to pull the nose to level pitch attitude upon reaching the glide slope. (This would be indicated by the movement of the needle.) At point C, the airplane would pass through the glide slope in 3 to 4 seconds, and the glide slope needle would reverse in that time. A reaction delay of several seconds would place the airplane at 347 feet absolute altitude, at the bottom of the glide slope fan. As elevator was applied to place the airplane in level attitude, the rate of descent would continue at 2,000 to 2,400 fpm. If power was not applied, or the pitch attitude was not increased more than level, the airplane would strike the ground in 8 to 9 seconds.

If the IP had been watching the airfield lights and monitoring the student's approach, the lights could have disappeared at the time the airplane descended through the glide path. The IP would have to transition from partial VFR to IFR near the ground, while in a high rate of descent. Eight to nine seconds is not much time and offers absolutely no room for error.

During approaches, the pilot must exercise proper technique to control the flight path—attitude plus power equals performance. If the pilot interprets his position below the desired glide path, his first reaction *must not be to only ease the nose up*. The result will be a decrease in air speed, but little, if any, decrease in the rate of descent.

George E. Bean
Aircraft Accident Review and Analysis Department
USABAAR

The 29 inadvertent IFR accidents during 1969 were of extreme concern throughout Army aviation . . .

YOU DO OR YOU DON'T

Is the tactical instrument card a successful method of preventing these mishaps?

DUE TO A sizeable increase in mishaps involving inadvertent IFR flying, USABAAR conducted a study of those which occurred during calendar year 1969. This study was made on a worldwide basis and included all types of aircraft in the inventory. Data was obtained from aircraft accident investigation reports only to ensure use of the most accurate information available. Although there were 17 incidents involving inadvertent IFR flights, these were not included in the study as they were reported by crash facts messages only. Areas covered included accident classifications, facilities, darkness, combat missions, urgency of missions, formation, instrument qualifications, command supervision, get-homeitis and violations of directives. Command supervision was carefully studied for training and lack of training. We were particularly interested in knowing if accidents occurred after missions were completed and aircraft were returning to base (get-homeitis), and if any violations of regulations, SOPs or other directives were involved.

Twenty-eight of the 29 accidents studied involved

ARMY

YOU DO OR YOU DON'T

helicopters. These accidents, which included 10 fatalities, were tabulated in these categories:

ACCIDENT CLASSIFICATIONS:		
STRIKE	19	
MAJOR	9	
MINOR	1	
FACILITIES:	4	
DARKNESS:	17	
COMBAT:	24	
URGENCY INVOLVED:	11	
FORMATION:	7	
INSTRUMENT QUALIFICATIONS:		
TACTICAL:	23	
STANDARD:	6	
EXPIRED:	5	(Tactical)
COMMAND SUPERVISION:	11	
TRAINING:	8	
RETURNING TO BASE:	11	
VIOLATIONS INVOLVED:	8	

Most startling are the 23 tactical instrument and 6 standard instrument cards involved in these accidents. Of the 29 instrument cards held by the crews involved in these accidents, only five tactical instrument cards had expired. This means that aviators holding current instrument cards were involved in 24 of the 29 inadvertent IFR accidents.

Is the tactical instrument card a successful method of preventing inadvertent IFR mishaps? These statistics appear to indicate it is not. However, this is not so. There are no records available that reflect the number of successful IFR flights by aviators with tactical instrument cards, whether planned or inadvertent.

Let's take a look at the philosophy behind the tactical instrument card. First, aviators are trained and issued tactical instrument cards so they can safely plan and fly instrument flights during tactical situations. Second, if IFR weather is inadvertently encountered, aviators must take appropriate action to (1) conduct flights using instrument procedures or (2) fly their instruments, assure that enough altitude is available and make a 180-degree turn to fly out of the weather. The point is, you either fly IFR or you don't. Attempts to remain VFR under IFR conditions have been and continue to be a dominant factor in all mishaps associated with weather.

Six of the 19 strike accidents listed occurred in formation flights of four or more aircraft in which the flight leaders were seen to enter IFR conditions. They crashed while attempting 180-degree turns. The remaining aircraft in these formation flights managed to complete 180-degree turns without entering IFR conditions.

Examination of the accident reports revealed that, although most of the aviators involved had current instrument tickets, all had very little hood time. This suggests lack of training to retain instrument flying proficiency. In discussing this situation with many aviators who have returned from USARV, it was learned that the environment in that area does not lend itself to an effective instrument training program. Low hood time for the aviators involved in these accidents substantiates this.

In checking with a number of highly qualified instrument instructors, we found them greatly concerned over the many losses in this study. Their concern stemmed from the fact that they considered aviators highly professional instrument pilots upon completion of instrument training. However, when aviators complete tactical instrument training and are awarded tactical instrument cards and graduated as rotary wing aviators, sometimes a period of up to 5 months will pass before the aviators arrive in USARV and are faced with the probability of using this instrument training. This fact alone should make it mandatory for the individual to immediately become current in instrument flying. But can he really do this? Aircraft availability versus mission requirements in the past have not allowed commanders to schedule aircraft solely for training missions, despite individual efforts to regain proficiency.

The 29 inadvertent IFR accidents during calendar year 1969 were of extreme concern throughout Army aviation and have resulted in numerous studies being initiated at DA, CONARC, USABAAR and USAAVNS. Key findings of these studies show that both commanders and individual aviators must place an increased emphasis on instrument training, standardization and safety. The problem of inadvertent IFR accidents can be solved if personnel at all levels make a thorough and detailed analysis of existing

aviation programs, pinpoint weak areas and take action to make improvements. Unless this action is taken, tragic losses due to inadvertent IFR flight will continue. Following are typical examples of the type accidents discussed:

Flying at night, a CH-47A entered inadvertent IFR flight conditions, followed by crew disorientation, resulting in a steep dive. Excessive air speed built up, resulting in a violent deceleration recovery. The helicopter entered heavy cloud layers, followed by heavy snowshowers. The aircraft commander managed to regain some semblance of control, successfully completed a 180-degree turn and returned to home base. There was major damage to the Chinook.

A UH-1H on a VFR mission entered inadvertent IFR flight conditions. During the attempt to make a turn out of the IFR conditions, the helicopter entered thunderstorms, crashed and burned. There were three fatalities and three injuries.

The term *current,* as applied to a tactical instrument card, is very misleading. The card is current in most cases because the allotted time prior to renewal has not passed. Example: A student pilot passes his final check flight for a tactical instrument card 1 May 1970. He does not graduate until 30 June 1970, which is the effective date for his tactical instrument card. Place his birthday at 29 December 1970 and this aviator would not be required to renew his tactical instrument card until 29 December 1971. This is a period of 18 months that an aviator could be entirely on his own as far as instrument proficiency is concerned.

Many units check out newly arriving aviators shortly after they arrive. Rarely, however, do they check the individual under the hood, although it is known that most units, if not all, have hood equipment available.

It is also recognized that the average aviator in USARV logs from 130 to 160 hours a month, most of which is combat flying. Asking these aviators to attempt added flight time under the hood to maintain instrument proficiency might be asking for the impossible. Yet, it is reasonable to assume that all concerned with this problem realize that something has to be done to prevent inadvertent IFR mishaps.

It appears at this point that, if we intend to prevent these mishaps, there are two alternatives available: (1) Expend the considerable effort required to schedule instrument proficiency training programs, or (2) curtail mission requirements at the slightest indication of weather conditions. The obvious answer to the problem, like it or not, is that aviators must maintain instrument proficiency through regularly scheduled instrument training flights. Simply stated, you do or you don't.

While leaning heavily on the tactical instrument card and individual aviator proficiency, other areas appeared in this study. Facilities were involved in four accidents. One of these was a revetment type accident, while the other three were major accidents due to blowing dust which caused pilots to lose visual reference in the landing area. There were 17 inadvertent IFR accidents at night. Of the 24 accidents during combat missions, there were 11 in which some sense of urgency in the following categories existed: Medevac, 3; TAC-E, 2; and Other, 6. The *other* category was difficult to distinguish as most accident investigation boards did not bring out this point. However, thorough examination of narratives and crew and witness statements did bring out some degree of urgency connected with six accidents. Two of these occurred when crews were dispatched to check the weather.

Command supervision contributed to 11 accidents, 8 of which were connected with training in some manner. These include missions into known marginal weather conditions and air crews unqualified for the type missions attempted. Most in this category came under command supervision training for failure to comply with the 90-day standardization check flight requirement.

The 11 accidents listed as returning to base only means that number of accidents happened during this phase of flight. If a get-homeitis condition existed, it was not brought out by the investigation boards' reports and supporting documents.

In conclusion, it is apparent we can expect the number of accidents to continue or grow, if mission requirements continue to dictate missions regardless of marginal weather, lack of qualified air crews or violations of existing directives. You do or you don't.

USAASO Sez

The U. S. Army Aeronautical Service Office discusses

The perils of wake turbulence

Quote from FAA AVIATION NEWS, March 1970

If a tower controller cautions you about wake turbulence, he is warning you that it may exist because of another aircraft that has recently made a takeoff or landing. He cannot tell you where it is or if you will actually encounter it during your operation. When you receive such an advisory, don't hesitate to ask for more information if you think it will help you to analyze the situation and determine your course of action. Even though a takeoff or landing clearance has been issued, if you believe it would be safer to wait, to use a different runway or to change your intended operation in some other way, ask the controller to approve a revised clearance.

"Sometimes clearance include the word 'immediate' such as 'cleared for immediate takeoff.' Such communications are to be interpreted as meaning that if the pilot takes off at once he will have adequate separation from other aircraft. It is not an 'order' to go. **If you have any reason to believe you cannot proceed safely, it is your responsibility to decline the clearance. The controller's primary job is to aid in preventing collisions between aircraft, not to advise pilots on flight procedures.**

"It is up to the pilot to recognize potential wake turbulence at an airport and to know what he can do about it. At least five options are open to him:

"(1) For takeoffs on the same or parallel runway behind a large, heavy aircraft plan to take off before the point where the larger aircraft left the ground. Remember that even in a 'no wind' condition a vortex from a departing aircraft on a nearby parallel runway could descend on your proposed takeoff route, so check out the takeoff point of that 707 on the runway next to you as well as the one that took off ahead of you.

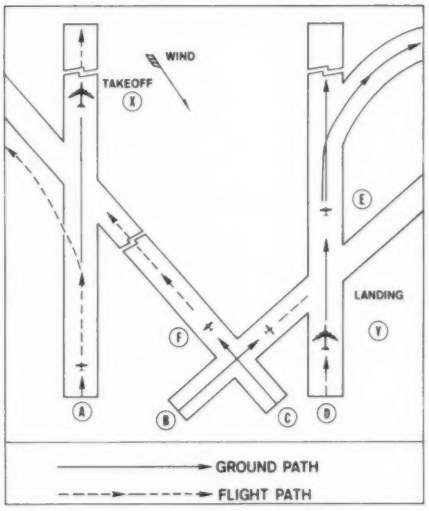
"(2) For takeoffs on intersecting runways remember the basic rule is to stay above the flight path of other departing aircraft. If the departing aircraft on the other runway was still on the ground well past your intersection, and your takeoff will permit you to climb approximately 100 feet or more before you reach the intersection, you should have clear air.

"(3) When taking off after a larger aircraft has landed on an intersecting runway, make sure that it touched down before it crossed your intersection. If this is not the case you may request a delay or an alternate runway.

"(4) When landing behind a large, heavy aircraft it is essential to remain above the flight path of the aircraft you are following and to touch down well beyond the point where he landed. In this way you will avoid encountering the turbulence which is settling behind and to either side of the larger aircraft.

"(5) When landing after the takeoff of a larger aircraft, make a normal touchdown well within the approach end of the runway. Plan to set your aircraft solidly on the ground before the larger aircraft's point of liftoff.

"(6) Refer to Airman's Information Manual, Part I, Chapter 5, for diagram of above information and example, page 1-90."



When large aircraft are taking off at X, small aircraft may land or take off at A, B, C or D, but should avoid taking off or landing at E. The prevailing cross wind could push turbulent air to this point. When large aircraft are landing at Y, small aircraft may land at A, B or E (but not at C or D) and may take off at A, B, C or E (but not at D) because of the proximity of wing tip vortices.

If we had an unlimited staff,
we'd get out and talk
to every one of you...

BUT THINGS ARE A LITTLE TIGHT HERE

So, you can help by filling out the questionnaire on page one and mailing it to us

Mrs. Douglas MacArthur Visits U. S. Army Aviation Museum

Mrs. Douglas MacArthur, wife of the late General Douglas MacArthur, inspected the general's famous aircraft, the Bataan, during a recent visit to the U. S. Army Aviation Museum at Ft. Rucker, Ala.

Mrs. MacArthur's activities at the Aviation Center and School included a helicopter tour of the installation facilities as well as a tour of the museum where the Bataan has been since its retirement by the National Aeronautics and Space Administration in March (see June 1970 DIGEST for story).

Major General George S. Beatty Jr., deputy commandant of the Aviation School, escorted Mrs. MacArthur on her tour (see above photo).

At right, Mr. William Howell, Aviation Museum curator, speaks to the general's wife in front of the historic Bataan during her visit.